THREE PAPERS ON MARRIAGE AND FAMILY IN CHINA

by

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TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 2

CHAPTER 3

CHAPTER 4

LIST OF TABLES

CHAPTER 2

CHAPTER 3

CHAPTER 4

ABSTRACT

China is a country of rapid social change and tremendous contextual variations. This dissertation examines how those societal conditions have formed and framed Chinese people's marriage and family behaviors.

Specifically, Chapter 2 reports on a surprising inverted U-shaped trend in age homogamy from 1960 to 2005. One plausible explanation is that intensified economic pressure and rising consumerism during the post-1990s reform era have acted to increase women's desire to marry men who are more economically established, and thus usually older.

Chapter 3 examines how marital behaviors of a unique Chinese Muslim group – Hui – respond to varying conditions of local ethnic marriage markets. Results show that in places with higher Hui concentrations, Hui tend to have higher marriage rates, marry earlier and marry more endogamously. Conditional on being married, the logged odds of exogamy over endogamy is significantly lower in places with higher Hui concentrations; nevertheless, the negative relationship between Hui concentration and the logged odds of exogamy over singleness only holds for women. This indicates the competition between the norm of universal marriage and the norm of endogamy. Moreover, while men are more responsive to the change in Hui concentrations, women are more strictly constrained by the norm of universal marriage than men at all levels of Hui concentration. Men and women are equally restricted by the norm of endogamy.

Chapter 4 examines the gender-specific fertility effects on parents' time use, income and subjective well-being. Using gender of the first child as an instrumental variable based on the regional exemptions to the one-child policy in China, we aim to establish the causal estimates of the fertility effects. Results show that with more children, fathers spend significantly more time working and less time taking care of family members. Mothers, on the other hand, report better subjective well-being.

This dissertation contributes toward understanding of the contextual influences, temporal or regional, on individuals' marriage and family behaviors, under a research setting of transition and diversity. Future directions for this line of research point to the incorporation of theories which account for the setting-specific mechanisms regarding gender, marriage and family.

CHAPTER 1

Introduction

This dissertation consists of three papers on marriage and family in contemporary China. As a country of rapid social change and tremendous contextual variations, China provides a unique research setting to investigate the contextual influences, temporal or regional, on individual behaviors. This dissertation examines how China's various societal conditions have formed and framed Chinese people's marriage and family behaviors.

The first paper reports on a study of trends in marital age homogamy in China from 1960 to 2005 that uses data from the China 2005 1% Population Inter-census Survey (mini-census). Instead of a consistent increase in age homogamy, as expected, results show an inverted U-shaped trend. One plausible explanation is that intensified economic pressure, rising consumerism, and a shrinking gender gap in education during the post-1990s reform era have acted to increase women's desire to marry men who are more economically established, and thus usually older, than less financially secure men. We argue that age hypergamy maintains status hypergamy, a deeply rooted norm for couples in China. An auxiliary analysis based on the human capital model for earnings supports this interpretation. A continued trend in age hypergamy implies a future "marriage squeeze" for men of low socioeconomic status.

The second paper examines how marital behaviors of Hui Muslims respond to varying conditions of local ethnic marriage markets. Specifically, we explore marriage patterns

indicating adherence to two Islamic norms: universal marriage and endogamy. We measure marriage market conditions by local concentrations of Hui and estimate discrete-time hazard models of marital outcomes using data from the China 2005 mini-census. Results show that in places with higher Hui concentrations, Hui tend to have higher marriage rates, marry earlier and marry more endogamously. Conditional on being married, the logged odds of exogamy over endogamy is significantly lower in places with higher Hui concentrations; nevertheless, if we put exogamy as an alternative to being single, coefficient on the logged odds of exogamy over singleness is only significantly negative for women. This indicates the coexistence of and the competition between the two norms. Moreover, women have consistently higher marriage rates than men, regardless of the level of Hui concentrations. This indicates that women are constrained more strictly by the norm of universal marriage than men on a global basis. However, men are more responsive to the change in Hui concentrations with their larger variation in marriage rates. Men and women are equally restricted by the norm of endogamy.

The third paper establishes causal estimates of the fertility effects on a variety of outcomes. "Motherhood penalty" and "fatherhood premium" regarding labor market outcomes have been established by an array of empirical studies. However, validity of the fertility effects has been controversial due to the potential selection bias. Moreover, fertility effects on subjective outcomes are also crucial while receiving limited attention. China's exemption policy to the one-child policy that couples whose first child is a girl can have a second child makes gender of the first child a powerful instrumental variable (IV). Based on the IV approach, this paper examines the gender-specific fertility effects on parents' time use, income and subjective well-being outcomes, using the nationally-representative 2010 Chinese Family Panel Studies (CFPS).

Results show that with more children, fathers spend significantly more time working and less time taking care of family members. Mothers, on the other hand, report better subjective well-being. That is, we find premiums for both fathers and mothers and penalty for neither.

CHAPTER 2

Marital Age Homogamy in China: A Reversal of Trend in the Reform Era?[1]

2.1 Introduction

Social homogamy, or marriage between individuals with similar social characteristics (Burgess and Wallin, 1943), is a common practice in many societies. In the literature on marriage and social stratification, an increase in homogamy based on such attributes as socioeconomic status, education, and race/ethnicity is generally considered an indicator of declining social openness and increasing social inequality (Harris and Ono, 2005; Kalmijn, 1991, 1998; Mare, 1991; Mare and Schwartz, 2006; Raymo and Xie, 2000; Schwartz, 2010; Schwartz and Mare, 2005; Smits, Ultee, and Lammers, 1998; Torche, 2010; Zijdeman and Maas, 2010).

Another form of homogamy is age homogamy, or marriage between individuals of similar ages. The level of age homogamy is also an important indicator of social closure and gender inequality, as large age differences between spouses have been associated with more patriarchal family systems and less spousal intimacy (Blossfeld, 2009; Shorter, 1977; Van de Putte et al., 2009; Van Poppel et al., 2001). However, this type of homogamy has received less attention among researchers than social homogamy based on the aforementioned attributes. While the literature includes several studies of age homogamy (e.g., Atkinson and Glass, 1985;

[1] Chapter 2 is co-authored with Yu Xie.

Esteve, Cortina, and Cabré, 2009; Van de Putte et al., 2009; Van Poppel et al., 2001), none deals with a long-term trend in contemporary China, particularly reform-era China.

This study analyzes trends in age homogamy in China between 1960 and 2005, using indicators based on Schoen's forces of attraction (Esteve et al., 2009; Qian and Preston, 1993; Schoen, 1981, 1988) and data from the nationally representative China 2005 1% Population Inter-census Survey (or the 2005 mini-census). Instead of a consistent increase in age homogamy, as one might expect from the literature, we found an inverted U-shaped trend over the period. One plausible explanation is that intensified economic pressure, rising consumerism, and a shrinking gender gap in education during the post-1990s reform era have acted to increase women's desire to marry men who are more economically established, and thus often older than their less financially secure counterparts. Age hypergamy acts to maintain status hypergamy, a deeply rooted value for couples in China.

2.2 Background

2.2.1 Age homogamy and economic development

A large literature in sociology has explored trends in social homogamy (Atkinson and Glass, 1985; Esteve et al., 2009; Han, 2010; Kalmijn, 1991, 1993, 1998; Mare, 1991; Qian, 1997; Qian and Lichter, 2007; Raymo and Xie, 2000; Schwartz and Mare, 2005; Song, 2009; Van de Putte et al., 2009; Van Poppel et al., 2001; Zijdeman and Maas, 2010). Whereas homogamy in other social attributes reveals inequality and social closure, age homogamy is indicative of gender equality and social openness (Casterline, Williams, and McDonalds, 1986; Shorter, 1977; Van Poppel et al., 2001; Wheeler and Gunter, 1987). A few studies have found either an increase or

no clear trend in age homogamy with economic development (Atkinson and Glass, 1985; Casterline, Qian, and Liu, 2010; Esteve et al., 2009; Qian, 1998; Van de Putte et al., 2009; Van Poppel et al., 2001).[2]

Age homogamy may increase with economic development for several reasons. While practices have varied across populations and periods, the traditional family in pre-industrial societies is characterized by a relatively large age gap between an older breadwinner husband and a younger wife with limited nondomestic labor participation (Van Poppel et al., 2001). This pattern of large age gap supports the patriarchal family system by reinforcing the husband's authority and impeding spousal intimacy (Barbieri, Hertrich, and Grieve, 2005; Cain, 1993; Van Poppel et al., 2001). However, with greater industrialization comes an expansion in women's economic roles outside the home and generally a narrowing of the age gap between husbands and wives. In this context, increasing age homogamy is taken to indicate a concomitant rise in gender equality and love-based (as opposed to necessity-based) marriages (Bozon, 1991; Van de Putte et al., 2009; Van Poppel et al., 2001).

Kalmijn's (1991, 1998) general framework for explaining social homogamy offers a rationale for why the spousal age gap is affected by social development. Within Kalmijn's framework are three sets of explanatory factors : (1) the preferences of marriage candidates, (2) the impact of "third parties" (e.g., marriage candidates' parents), and (3) the interaction

[2] We are aware that there are some empirical literatures showing no clear trend in age homogamy. However, we will make no further discussion on this finding. The reasons are two-folds: first, literatures of this kind are highly limited in number and are subject to very restrictive social or temporal contexts. Therefore, findings of no clear trend are mostly made as auxiliary results aside from the main findings. Secondly, none of the literatures provide theoretical explanations on this kind of findings and left them as empirical inconsistencies.

structures of the marriage market. All three factors are affected in favor of age homogamy by the process of economic development (Raymo and Iwasawa, 2005; Smits et al., 1998; Song, 2009).

By "preference," social researchers commonly mean individuals' choices free of structural constraints and motivated by their own social values and beliefs. Marriage is a social institution that binds two persons together in an intimate living relationship. Of course, people may get married for different reasons: some to complete an economic exchange, some out of family or even national interests, and some for romantic love. As a society changes from agricultural to industrial, however, romance becomes increasingly the accepted and even predominant basis for marriage due to the less necessity and desire for economic-exchange marriages and also due to more opportunities for the young adults to interact (Blossfeld and Timm, 2003; Thornton and Lin, 1994; Xu and Whyte, 1990). Admittedly, persons of different ages can and do form strong bonds based on romantic love, but romance is most likely to develop when partners interact directly and are similar in such characteristics as age, culture, tastes and physical conditions (Bhrolchain, 1992; Van Poppel et al., 2001). Thus, a shift to a love-based mate-selection norm is more likely to lead to smaller age differences (Bozon, 1991; Van Poppel et al., 2001; Wheeler and Gunter, 1987).

Regarding the second set of factors, it is well established that as a society becomes industrialized, individuals depend less on parents or other authority figures ("third parties") in their decisions about family-related behaviors – including marriage (Barbieri et al., 2005; Goode, 1970; Thornton, 2001; Thornton, Axinn, and Xie, 2007; Thornton and Lin, 1994; Xu and Whyte, 1990). When young adults are left on their own to choose potential spouses, they select from those whom they know best – most likely age peers – and these marriages reduce the overall

spousal age gap (Bozon, 1991; Casterline et al., 1986; Van Poppel et al., 2001; Wheeler and Gunter, 1987).

Along with personal preference and the impact of the third parties, age homogamy can also be affected by the structure of the marriage market, which itself may be affected by economic development (Atkinson and Glass, 1985; Bhrolchain, 1992; Bytheway, 1981; Kalmijn, 1991, 1998; Lichter, Anderson, and Hayward, 1995; Stier and Shavit, 1994; Todd, Billari, and Simão 2005; Vera, Berardo, and Berardo, 1985). With development, educational attainment generally increases. As a result, youths spend an increasingly large fraction of their pre-marital years in school, resulting in a much higher probability of individuals finding spouses among their schoolmates. This may be especially true for those receiving higher education, as the timing for pursuing postsecondary education usually parallels that for selecting marriage partners. Therefore, lengthened education completion may transform postsecondary institutions into important marriage markets and thus may increase the incidence of age homogamy (Blossfeld and Timm, 2003; Mare, 1991).

For the reasons above, a consensus has emerged in the literature that economic development generally leads to a rise in age homogamy. This prevailing theoretical view is supported by empirical evidence from a variety of countries. For example, Casterline et al. (2010) report that during the past three decades 17 of 24 low-income countries under study experienced an increase in low-age-gap marriages with a gap of 0-5 years (0 and 5 included). The increases ranged from 0.2% for Peru between 1977 and 2004 to 20.5% for Ghana between 1979 and 2008. Wealthier countries experienced similar increases in low-age-gap marriages with growing development. For example, U.S. marriages with 0 to 4-year spousal age gaps (4

included) increased from 37.1% in 1900 to 63.3% in 1960 and 69.9% in 1980 (Atkinson and Glass, 1985). The percentage of marriages with age gaps of less than two years (two excluded) rose by 7%-20% for the Dutch regions between 1812 and 1913 (Van de Putte et al., 2009). The proportion of marriages with 0 to 5-year age gaps (5 included) increased from 35% in the mid-nineteenth century to more than 50% in the 1970s and early 1980s for the Netherlands (Van Poppel et al., 2001), and from 36% to 49% in Spain, 1944–2000 (Esteve et al., 2009).

Thus, previous studies all indicate a decline in the age gap between spouses, particularly during periods of development. Is this generalization universal? Specifically, does it hold true for China in its recent past? We will answer these questions in the remainder of our paper.

2.2.2 The Chinese context

The People's Republic of China was founded in 1949 after the Communist Revolution. For the first 30 years, employment opportunities, consumption, and even family life in China were largely regulated by the state, and the Communist ideology regarding equality prevailed (Meisner, 1999; Parish, 1981; Whyte, 2010; Yu and Xie 2013). In 1978, China began its economic reform, leading to dramatic improvements in economic and educational outcomes (Hauser and Xie, 2005; Qian, 2000; Whyte, 2010; Xie and Hannum, 1996). For example, from 1978 to 2005, China's per capita GDP grew from 381 yuan to 2,062 inflation-adjusted yuan, averaging an annual growth rate of 6.45% (China Statistics Press 2006: Table 3-1, 3-17). In terms of education, from 1978 to 2005, the proportion of population enrolled in postsecondary

institutions grew from 0.09% to 1.19% (China Statistics Press 2006: Table 4-1, 21-6),[3] while from 1982 to 2005, the illiteracy rate dropped tremendously from 31.87% to 11.04%[4] (China Statistics Press 1985: Table 6 of the Third Census Document; 2006: Table 4-13). For persons aged 25-29, the age range in which marriage usually occurs, the percentage completing postsecondary education grew dramatically from 1.04% in 1982 to 12.66% in 2005 (China Data Center 1982: Table 5-48; 2005: Table 4-1).

Since the Communist Revolution in 1949, women's social standing in China has improved significantly (Hannum, 2005; Lavely et al., 1990; Song, 2009; Zhang, Hannum, and Wang, 2008). The 1950 Marriage Law formally legalized free-choice marriages and explicitly protected wives' rights and interests, making them equal to those of husbands (China Administration Council 1950: Item 5). Women's educational attainment has gradually caught up with that of men (Treiman, 2013; Wu and Song, 2010: Table 2; Wu and Zhang, 2010). For instance, in 1982, 1.24% of men and 0.64% of women had postsecondary education – rates that grew respectively to 6.72% and 5.63% in 2005, narrowing men's advantage from about 100% to only about 20% (China Data Center 1982: Table 5-46; 2005: Table 4-1).

In general, increases in women's social status has challenged status hypergamy – the tendency of women to marry men of higher social status – which is an indigenous practice in China and other East Asian countries (Baker, 1979; Croll, 1981; Dasgupta, Ebenstein, and Sharygin, 2010; Fan and Li, 2002; Freedman, 1970; Meijer, 1971; Raymo, 2003; Raymo and

[3] All percentages completing postsecondary education in this sentence and in the next paragraph were computed as ratio of population completing postsecondary education over that receiving any education, due to data availability.

[4] The base for the 1982 illiteracy rate is population 12 years and older, and that for the 2005 illiteracy rate is population 15 years and older. This comparison gives us a conservative evaluation of the drop in illiteracy.

Iwasawa, 2005; Watson and Ebrey, 1991; Xu, Ji, and Tung, 2000; Yang, 1959). Chinese society has historically maintained a patriarchal and patrilineal family system (Thornton and Lin, 1994; Xu et al., 2000). Since women had limited access to work outside their households, a woman's social status was determined by that of her parents before marriage and by that of her husband after marriage. Under this rigid patriarchal system, the man customarily assumed the role of primary breadwinner, which meant that his socioeconomic status was higher than that of his wife. Thus, status hypergamy has long been a prevalent cultural norm in Chinese society. Along with women's improved social status, the practice of status hypergamy may have been eroded to some extent.

These recent and dramatic social changes in China – increasingly free choice in mate selection, improved economic well-being, and women's rising social status – provide a highly relevant context in which to analyze trends in age homogamy. The literature suggests that these social changes should all have led to increasing age homogamy for contemporary China. But has this been the case? We will answer this empirical question in the remainder of our paper.

2.3 Data and methods

This study uses both descriptive statistics and homogamy indicators based on "forces of attraction" (Esteve et al., 2009; Qian and Preston, 1993) to analyze age homogamy trends. To examine the robustness of the descriptive results, we also apply log-multiplicative layer effect models using year of marriage as the layer variable. Due to space limitation, we do not report all the results.[5] We use data from China 1% Population Inter-census (or the 2005 mini-census).

[5] Results using log-multiplicative layer effect models are posted on the author's website.

2.3.1 Analytical samples

We first restrict our analysis to individuals aged 15 and older to exclude those ineligible for marriage. Next, to compute forces of attraction, we construct for each study year two subsamples: one of single individuals who have never been married, and the other of couples. Constructing these subsamples retrospectively from 2005 data, we must account for women's lower mortality than men's (Yaukey, Anderton, and Lundquist, 2007), which could result in significant underestimation of spousal age gaps for earlier marriage cohorts. Hence, we restrict our analyses of both singles and couples subsamples to the period 1960-2005, rather than the period 1929-2005, the years covered in the original dataset.

For the singles subsample, we set the marriageable age range at 15 to 50 for each marriage cohort. Note that we need to construct for each marriage cohort a pool of single persons at risk for marrying, including those who were married later. Therefore, this reconstructed subsample of "singles" includes all persons aged 15 to 95 in 2005 who were either married at some point after 1960 or still single in 2005. These restrictions leave us with a total of 1,880,015 in the singles subsample: 947,324 males and 932,691 females.

For the couples subsample, we restrict the data to couples in which both partners were married for the first time that year, forming the marriage cohorts. These restrictions result in a total of 459,721 couples in marriage cohorts between 1960 and 2005. We use this larger couples sample for descriptive analyses and log-multiplicative layer effect models. However, to compute homogamy indicators based on forces of attraction, we further restrict the sample to couples in which both spouses were 15 to 50 years of age, the assumed marriageable age range, reducing the total to 459,291 couples.

We are aware that the actual mate-selection process cannot be determined by a single person but requires the cooperation of two marriage partners and often their families as well. That is, individual partners must be jointly involved in making a decision to get married. As described above, our analytical sample is based on observed marriages. For this reason, our data pertain to actually contracted marriages and thus cannot reveal individuals' latent preferences or processes that led to the marriages. However, to achieve our objective of understanding trends in age homogamy in China's recent past, observed information about husbands and wives in contracted marriages is actually what we want. One advantage of our reduced-form approach is that our indicators of homogamy can be easily constructed from retrospective data and are comparable over time.

From the 2005 mini-census data, we reconstruct, retrospectively, the experiences of marriage cohorts. Because only age at first marriage is included in the dataset, we restrict our analyses to first marriages, which may introduce a bias into our study. Past studies on trends in homogamy have relied on repeated cross-sectional data on recently contracted marriages or newlyweds to avoid bias from selective marital dissolution or remarriage (e.g., Kalmijn, 1994; Mare, 1991; Qian, 1998; Qian and Preston, 1993; Raymo and Xie, 2000; Schwartz and Mare, 2005). However, given the very low divorce rates in China throughout this period, [6] we do not anticipate a severe problem in our sample, though it is still useful to speculate on the direction of such biases. As many scholars of marriage have argued, larger spousal age differences often predicts higher risks of divorce (Bumpass and Sweet, 1972; Day, 1964; Levinger, 1976; Wilson and Smallwood, 2008), and marriages of higher parity tend to have larger spousal age gaps

[6] Divorce rates range from as low as 0.035% in 1980 to as high as 0.137% in 2005 (China Statistics Press, 2006).

(Atkinson and Glass, 1985; Bhrolchain, 1992; Dean and Gurak, 1978; Vera et al., 1985). Given the rise in divorce rates during the study period, our focus on first marriages is likely to exert an upward bias on trends in age homogamy, especially for more recent periods.

Our exclusion of couples in which one or both partners is a remarried widow/widower may also affect the results. Although widows used to be discouraged from remarriage due to China's traditional emphasis on female chastity (Campbell and Lee, 2002; Marriage and Family Encyclopedia, 2009), widow remarriage has become more common in contemporary China with advancements in women's social status and individual rights. This change, combined with the positive link between marriage parity and spousal age gaps, means the exclusion of remarried widows should also lead to an increasing upward bias in age homogamy.

Additionally, given the cross-sectional nature of the 2005 mini-census dataset, a majority of the younger individuals in 2005 may not yet have completed their mate selection process, suggesting our couples sample of the recent marriage cohort may have a disproportionately high proportion of younger-age marriages. According to the literature, younger-age marriages are characterized by smaller age gaps than later-age marriages (Qian, 1998; Van Poppel et al., 2001). Hence, we may find an overestimation for age homogamy in more recent marriage cohorts. In a later section, we will discuss these potential influences with regard to specific results.

2.3.2 Homogamy indicators

The concept of force of attraction was first introduced by Schoen (1981, 1988). It is a special type of marriage rate based on the harmonic mean of single males and females – that is, those at

risk for marriage – for each spousal age combination. The mathematical formula of force of attraction is:

$$\alpha_{ij} = \frac{m_{ij}}{\frac{H_i W_j}{(H_i n) + (W_j n)}} \quad , \tag{1}$$

in which m_{ij} indicates the number of marriages between males aged i and females aged j; i and j are both age intervals; n is length of the intervals and varies with the definition of age homogamy; H_i and W_j respectively identify the number of eligible males at age i and that of eligible females at age j. In this formula, the number of marriages that are actually contracted is considered along with the amount of potential exposure between eligible males aged i and females aged j. Thus, the entire population at risk for marriage is taken into account (Blossfeld and Timm, 2003). Compared to investigations of only prevailing marriages, our analysis controls for changes in age-sex composition of the marriage market.

For each marriage cohort, we calculate a homogamy indicator based on forces of attraction (Esteve et al., 2009), which is the ratio of sum of forces of attraction (α_{ij} as defined in Equation (1)) where i equals j, over the sum of all forces of attraction. This indicator reflects the strength of preferences for age homogamy over the overall distribution of couples. It ranges from 0 to 1, with higher values indicating stronger preferences for age homogamy.

We construct forces of attraction and homogamy indicators respectively with single-year, three-year, and five-year age-gap groups. As Van Poppel and colleagues (2001) demonstrated, dividing age at marriage into groups with mandatorily determined boundaries and widths can only identify level of heterogamy with relatively large spousal age gaps and thus may produce

inaccurate results. Furthermore, this approach may classify some marriages with a small age gap (e.g., husband marrying at 35 and wife at 34) as heterogamy, while classifying others with a large age gap (husband marrying at 34 and wife at 30) as homogamy. Therefore, experimenting with changing age groupings enables us to mitigate the negative impact of categorization by observing robustness of the results. These different groupings can also provide levels of age homogamy based on definitions of varying strictness. While homogamy indicators with single-year age groups define age homogamy in the most conservative sense, those with five-year age groups provide a much more liberal definition.

2.3.3 Marriage cohorts and birth cohorts

Globally, the distribution of average age at marriage by gender differs by marriage cohorts and birth cohorts. In the Chinese case, the average age at marriage increased from 1960 to 2005. This trend and related confounding factors may distort trends in age homogamy over marriage cohorts. To confirm our results based on marriage cohorts, we examine patterns in age homogamy by birth cohort and gender.[7] A methodological difficulty is that some of the single persons in the most recent birth cohorts had yet to enter marriage by 2005. Analyses of married couples in these birth cohorts are likely to underestimate not only average age at marriage, but also spousal age gaps, since earlier marriages tend to be more age homogamous (Qian, 1998; Van Poppel et al., 2001).

Our solution in addressing this censoring problem is to find, for each birth cohort and for men and women respectively, the median age at first marriage – in this case, the age at which

[7] We thank an anonymous reviewer for making this suggestion.

half of the birth cohort population married. We then compute descriptive measures of age homogamy for each birth cohort, separately by gender, for those individuals who married for the first time at the median age. By focusing on the trends in age homogamy for persons married at the birth-cohort-specific median ages, we are able to observe patterns in age homogamy that are representative of different birth cohorts. Moreover, due to the mortality attrition of the older population, patterns for those older birth cohorts may not be reliable. Therefore, we present trends of birth cohorts only for 1940 or later for men, and 1941 or later for women. Initial analyses showed that the median ages of first marriage steadily increased in our sample, from 24 for men and 20 for women in the 1940 birth cohort to 25 for men and 23 for women in the 1980 birth cohort.

2.4 Results

2.4.1 Trend in marital age homogamy

[Figure 2.1 about here]

Figure 2.1 presents results on trends in age homogamy using measures of 0, 1, 3, and 5-year spousal age gaps (husband's age minus wife's age), by marriage cohorts. The bottom line shows proportions of couples with no age gap – the most conservative definition of age homogamy. The next three lines above show proportions of couples with an age gap of, respectively, 0 to 1 year, 0 to 3 years, and -1 to 4 years. The four lines depict a very similar trend: rather than a consistent increase in age homogamy, as expected from the literature, all four lines show increases in homogamy for marriage cohorts prior to 1990 and decreases thereafter.

We obtain a similar inverted U-shaped trend in our analyses using homogamy indicators by forces of attraction. This analysis is not a repetition of those shown in Figure 2.1. By using homogamy indicators, we can evaluate underlying preferences for age homogamy while controlling for the confounding influence of the age-sex composition of the marriage market. Appendix Tables 2.1 to 2.3 provide homogamy indicators based on age groupings of a single year (e.g., ages 20 and 21), 3 years (e.g., ages 20-22 and 23-25), and 5 years (e.g., ages 20-24 and 25-29), respectively. As can be seen from these results, the inverted U-shaped trend in age homogamy holds true for all three age groupings and for varying methods of computing moving averages. This analysis also shows increasing age homogamy among marriage cohorts up until the early 1990s, and decreases thereafter.

[Figure 2.2 about here]

To observe the trends more clearly, we computed moving averages for the three age groupings of homogamy indicators, with equal and varying weights for the adjacent three, five, seven, nine and eleven marriage cohorts. Among the three sets of homogamy indicators, the trend based on the three-year age groups is especially sharp, and Figure 2.2 presents two trends for this set – one for raw homogamy indicators and one for moving averages for the adjacent seven marriage cohorts with equal weights. As can be seen, the two trends are generally consistent with each other in spite of short-term fluctuations shown in the raw indicators. The trend based on moving averages is clear: From 1960 to the mid-1960s, age homogamy increased slightly; the trend was unstable between 1967 and 1976, around the period of the Cultural Revolution; it increased steadily from the mid- to late-1970s until the early 1990s, and then it began to decrease.

To further check our results, we also conduct analyses based on log-multiplicative layer effect models (Raymo and Xie, 2000) with varying design matrices. An inverted U-shaped trend is found for all the models used.

[Figure 2.3 about here]

Do we find similar inverted U trends in age homogamy if we examine birth cohorts instead of marriage cohorts? In Figure 2.3, we show trends in age homogamy by birth cohorts for men and women who got married at the birth-cohort-specific median age at first marriage. For this figure, age homogamy is operationalized as a spousal age gap of 0 to 3 years (0 and 3 included). As discussed above, this homogamy measure for those married at the median first-marriage age obviates the methodological problems of the "right censoring" for the most recent birth cohorts. To make the trends smoother, we presented moving averages for the adjacent seven birth cohorts with equal weights. Here also we see inverted U-shaped trends for both men and women, with peaks occurring around the times suggested by results using marriage cohorts. Specifically, for men, the peak in age homogamy occurs at 74.97% for the 1968 birth cohort in 1991 with a birth-cohort-specific median first-marriage age of 23; for women, the peak occurs at 70.34% for the 1973 birth cohort in 1995 with a birth-cohort-specific median first-marriage age of 22. While men and women reached peaks in age homogamy in different years, the peaks both belonged to marriage cohorts post 1990, which was earlier shown by analysis based on marriage cohorts. Note that the trend for women lags behind that for men, reflecting the fact that women on average marry at a younger age than men do.

Because, as discussed, our sample construction and restriction methods should lead to overestimation of age homogamy for more recent marriage/birth cohorts, we consider the

observed reversal of the upward trend in age homogamy after the early 1990s to be a conservative finding. That is, we expect the actual reversal to be even more pronounced.

2.4.2 Hypogamy or hypergamy?

The decline in age homogamy after the early 1990s may indicate a recent increase in age hypogamy (older women marrying younger men) and/or age hypergamy (younger women marrying older men). However, the theoretical implications of these two potential increases are quite different. While an increase in age hypogamy may indicate growth in liberal attitudes on gender relations and marriage, a rise in age hypergamy may reflect a shift toward conservative marriage values in which husbands have authority over wives. Therefore, distinguishing changes in either age hypogamy or age hypergamy could shed light on the underlying causes of the recent dip.

[Figure 2.4 about here]

Accordingly, we took the ratio of age hypergamy (percent of couples with a husband-minus-wife age gap larger than three years, three excluded) to age hypogamy (percent of couples with a husband-minus-wife age gap smaller than zero years, zero excluded) for each marriage cohort. Figure 2.4 presents this trend in relative hypergamy prevalence for men and women by marriage cohort – depicting trend lines that look like a horizontal flip of those shown in Figures 2.1 and 2.2. That is, the relative prevalence of age hypergamy to hypogamy decreased from 1960 to the late 1980s, and increased from the early 1990s on. This result reveals the importance of age hypergamy in the recent decline in age homogamy in the post-1990s reform era.

[Figure 2.5 about here]

Figure 2.5 shows trends in the relative hypergamy prevalence by birth cohort for men and women who got married at the birth-cohort-specific median age at first marriage. The trends presented are moving averages for the adjacent seven birth cohorts with equal weights, the same analytic approach used for results presented in Figure 2.3. The birth cohort trends in hypergamy depicted in Figure 2.5 reflect those for marriage cohorts in Figure 2.4, with declines among birth cohorts before 1965 and increases thereafter. Specifically, the bottom of trend for men occurs at 0.55 for the 1968 birth cohort in 1991 with a birth-cohort-specific median age at first marriage of 23; and the bottom for women occurs at 0.71 for the 1966 birth cohort in 1988 with a birth-cohort-specific median age at first marriage of 22. Both of these lows occur in marriage cohorts around 1990.

Confirming our interpretation of earlier results presented in Figures 2.1, 2.2 and 2.3, the pattern shown in Figures 2.4 and 2.5 indicates a decrease in age homogamy and a related increase in relative age hypergamy since the early 1990s. What has driven this spousal age gap increase in post-1990s reform era China? The next section discusses a possible explanation.

2.4.3 Economic pressure: an explanation for the reversal

At first glance, the recent decreases in age homogamy, and corresponding increases in age hypergamy, are surprising given the widely held belief in a positive relationship between age homogamy and development. However, China's reform era is a complex historical period characterized by shifting social processes, rapid economic growth, a sharp increase in standard of living, and, important to this analysis, a tremendous rise in consumer aspirations accompanied by increasingly severe market competition (Yu and Xie, 2013). In the pre-reform regime, almost all

domains of life, including employment, consumption, housing, and even family life, were largely regulated by the state in order to operationalize Communist egalitarian ideology. Consequently, inequality was low and economic expectations were highly limited. However, the reform has dramatically altered the context. In the course of economic growth, consumer aspirations have soared, leading to unrealistically high expectations regarding living standards and extremely strong economic pressures to realize these expectations (Davis, 2005). China's gigantic population and limited resources have intensified these pressures. A particularly salient example can be found in the skyrocketing housing prices, especially in those more prosperous cities where more and better employment opportunities are available. For instance, for all of urban China, the average housing price increased from 315 Yuan per square meter in 1991 to 2,628 Yuan per square meter in 2008 (Yu and Xie, 2013). During the same period, Beijing, China's capital, experienced an increase from 602 to 12,418 Yuan per square meter. As housing is often considered a prerequisite for household establishment, such rising housing prices have heightened economic expectations from marriage candidates and exerted increasing economic pressure on them (Yu and Xie, 2013) – pressure that may have affected age homogamy through several mechanisms.

First, from the bride's standpoint, increasingly severe competition within the labor market during the post-1990s reform era may have brought women back to a disadvantaged economic position. Some researchers (Summerfield, 1994; Zhang et al., 2008) have found that a narrow emphasis on short-term efficiency and profit-making among many companies during the most recent reform era have led to greater discrimination against women within the labor market. In recent years, women's unemployment increased significantly (Summerfield, 1994; Wu and

Song, 2010: Table 2). Facing this new unfavorable labor market environment, many women may be involuntarily forced back into homemaker roles. In light of their downgraded role in the labor market and the fast-rising cost of living, marrying an affluent, socially successful husband has once again become an attractive channel for achieving a higher social status. Since older men are more likely than younger men to possess higher social status and greater economic potential, this may make the prospect of an older husband more appealing (Bozon, 1991).

Second, from the groom's standpoint, men now face increasingly fierce market competition and higher costs in establishing households in reform-era China. In addition, women's lower economic potential and their concomitant higher interest in the economic prospects of men may increase pressure on men to act as breadwinners. Women's enhanced educational profiles may further raise the pressure (Raymo and Iwasawa, 2005). That is, men have to compete in both the labor and the marriage markets, with competition ever more intense on both fronts. To become more attractive to women, then, men may need to wait longer to marry while accumulating resources (Smock and Manning, 1997; Thornton, Axinn, and Teachman, 1995; Xie et al., 2003).

In short, while women may want to marry older men in response to their occupational downgrades, men may want to settle down later given the labor and marriage market competition they face. Thus, the same processes of reform that helped narrow spousal age gaps in the early years – by raising women's socioeconomic status and promoting individual rights – may have contributed, since the early 1990s, to widening spousal age gaps via increased market competition and economic pressure. For convenience, we call this the "economic pressure" explanation of decreasing age homogamy.

Status hypergamy is a component of the economic pressure explanation. As discussed, the roots of status hypergamy lie very deep in China, where it was practiced nearly universally for many centuries (Thornton and Lin, 1994). Although improved economic well-being and greater individualism during the initial stages of China's development may have weakened this practice, heightened economic pressure could have revived it. Theoretically speaking, status hypergamy can be attained through a variety of channels. Women can marry up in terms of achieved traits such as education or occupation, or ascribed traits such as age, family origins, or race/ethnicity. Among these domains, age and education are especially important to status. Age is highly related to overall socioeconomic status, since older individuals are likely to have accumulated more and better cultural and social resources (Van Poppel et al., 2001). And education is well established as a predictor of status via its connection to socioeconomic positions (Hauser and Xie, 2005; Mare, 1991; Mincer, 1974; Schwartz and Mare, 2005; Xie and Hannum, 1996; Xu et al., 2000) and to family origins (Blossfeld and Timm, 2003; Lucas, 2001; Mare, 1991; Raftery and Hout, 1993). Hence, women wanting to improve their social status through marriage are likely to prefer men who are older and better educated than themselves. The increase in women's educational attainment in the last half of the 20th century (Lavely et al., 1990) led to a rapidly narrowing educational gender gap in China (Hannum, 2005; Treiman, 2013; Wu and Zhang, 2010). Specifically, the ratio of spousal educational gap (husband's minus wife's years of schooling) to wives' years of schooling has decreased from 0.28 in 1960 to 0.16 in 1980, 0.10 in 1990 and 0.04 in 2005. Because the narrowing gender gap in education has made it increasingly difficult to practice status hypergamy with respect to education,[8] couples

[8] Although the educational gap also greatly narrowed in the pre-reform era, especially during the Cultural

may elect to achieve status hypergamy by means of age, whereby the older husband still maintains an economic advantage over his similarly educated but younger wife. Therefore, during the post-1990s reform era, the notion of "marrying up" may have reemerged with a different meaning: the husband tending to be older and economically better off than the wife, though not necessarily better educated.

Given these marriage market processes, women on the "high-end" and men on the "low-end" socioeconomically may find it particularly difficult to find suitable marriage partners (Raymo, 2003; Raymo and Iwasawa, 2005). However, given the overwhelming norm of universal marriage in China, these social pressures are likely to lead to delays in marriage, rather than non-marriages. Based on the 1982, 1990, 2000 and 2010 China census data, as well as the 1995 and 2005 China mini-census data, the proportion never married by age 30 has been consistently low. Specifically, from 1982 to 2010, percentages never married are respectively 5.17%, 4.89%, 4.34%, 4.51%, 4.49% and 4.99% for men, and 0.33%, 0.31%, 0.34%, 0.48%, 0.57% and 1.21% for women (China Data Center 1982: Table 7-71; 1990: Table 7-5; 1995: Table 4-4; 2000: Table L5-03; 2005: Table 6-1; China Statistics Press 2010: Table L5-05). Thus, the poor men are likely to delay marriage to accumulate enough economic resources to attract a wife, and the highly educated and economically well off women are likely to marry significantly older men who would be better established than themselves – both of which result in even greater spousal age gaps.

Revolution, it did not reach parity (Hannum and Xie, 1994). Status hypergamy is difficult to maintain only when the educational gap disappears. In addition, economic factors became important for entry to marriage only in the post-reform period (Yu and Xie, 2013).

To test the economic pressure explanation, we conduct an auxiliary analysis based on a revised version of Mincer's (1974) human capital model. In this analysis, we consider what possible role the narrowing gender gap in education may have played as a concrete causal mechanism for the economic pressure explanation. Because we do not have perfect data for this part, this analysis is intended mainly to demonstrate the relevance of this causal mechanism. The key idea is that, during the later stage of the economic reform and in the face of a decreasing educational gap by gender,[9] age may have begun to substitute for education as a proxy for men's higher status. To examine the effects of educational and age gaps on status hypergamy, we compare husbands' earnings premiums by holding average educational attainment and average age at first marriage at different levels for each marriage cohort. Lacking historical data on couples' earnings at the time of marriage, we instead use an estimation of their potential earnings through a revised version of Mincer's (1974) human capital model, in which the estimated earnings of the year of marriage are based on the average educational attainment and years of work experience for each marriage cohort. Specifically, we use the following equation for each gender:

$$\ln Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon , \qquad (2)$$

where Y is earnings, X_1 years of schooling, and X_2 years of work experience. All β's are unknown parameters, and ε is the residual unexplained by the model. Equation (2) deviates from Mincer's model in that it does not include the quadratic term of years of work experience.

[9] We are also aware that as higher education becomes more prevalent, postsecondary institutions may play an increasingly important role as locations for mate selection. Conducting the mate selection process in schools may lead to both educational and age homogamy. Under this circumstance, if the level of age homogamy still decreases in the post-1990s reform era, we can claim stronger evidence for the increasing expectation for men's economic potential in mate selection.

This is reasonable given that we restrict the analysis to individuals 20 to 30 years old, the age range in which most marriages occur and work experience increases earnings steadily. Thus, inclusion of the quadratic term is not theoretically compelling and may result in a loss of precision and predictive power of the model.

We use data from Chinese Household Income Project (CHIP) 1988, 1995 and 2002 to estimate β's in Equation (2), respectively for marriage cohorts 1985-1991, 1992-1998 and 1999-2005. We use data only for urban workers because personal earnings are ambiguous for rural residents in CHIP. Again, because our main objective here is illustrative, a systematic bias in the auxiliary analysis resulted from the restriction to urban workers should not invalidate the substantive conclusion. Given our specific purpose to estimate husbands' earnings premiums, as well as the gender differential in returns to education and experience, we estimate Equation (2) separately for men and women. Combined with other criteria for excluding observations with missing or incomplete data, this procedure yields samples of 2,052 men and 2,321 women from CHIP 1988, 1,013 men and 1,060 women from CHIP 1995, and 640 men and 709 women from CHIP 2002. We capture all forms of income, including the provision of cash bonuses and subsidies. Earnings in 1995 and 2002 are adjusted by the appropriate price indices so that all analyses are comparable in 1988 Yuan (China Statistics Press, 2006). Following Xie and Hannum (1996), we recode education into years of schooling[10] and calculate work experience as

[10] Less than three years of schooling=1; three years of schooling but less than primary school=4; primary school=6; junior high=9; senior high=12; trade school=13; community/technical college=15; college and graduate school=17.

the difference between current age and age at first year of experience, which varies with education.[11]

Once we obtain estimated β's, we apply average years of schooling and average age at first marriage for each marriage cohort using 2005 mini-census data to the regression equations to estimate earnings at the time of marriage. Here we extrapolate years of work experience from years of schooling and age at first marriage. We then estimate husbands' earnings premiums as the ratio of husbands' to wives' earnings, by marriage cohort. To explicitly illustrate the role of increases in the spousal age gap in compensating for decreases in the educational gender gap, we construct four trends according to (1) whether education was fixed to the 1985 level or was allowed to change as it actually did, and (2) whether age at first marriage was fixed to the 1985 level or was allowed to change as it actually did. The combination of these two specifications yields four trends for husbands' earnings premiums, one observed and three hypothetical, which are based on: (a) observed average educational attainment and average age at first marriage; (b) observed average educational attainment, with average age at first marriage held at the 1985 level; (c) observed average age at first marriage, with average educational attainment held at the 1985 level; and (d) average educational attainment and age at first marriage both held at the 1985 levels. The results are shown in Figure 2.6.

[Figure 2.6 about here]

As can be seen in Figure 2.6, trend (a) is interlaced with (b) until around 1995 and starts to diverge upward from (b) with increasing gaps thereafter. Meanwhile, trend (a) is interlaced

[11] Specifically, the ages at first year of experience for each educational level are: primary school and lower=14; junior high=16; senior high=19; trade school=20; community/technical college=22; college and graduate school=24.

with (c) briefly during the earlier stages of the reform and then diverges downward around 1987, with increasing gaps. Both divergences point to the plausibility of spousal age gaps substituting for spousal educational gaps in status hypergamy. Specifically, with the shrinkage of educational gaps without a corresponding increase in age gaps between husbands and wives, status hypergamy, as reflected in husbands' earnings premiums, cannot keep up with hypergamy based on the actual age and educational gaps, as shown by the comparison between (a) and (b). By the same respect, if female education had not increased as it has, the manner in which spousal age gap increases may lead to even higher husbands' earnings premiums than those based on actual age and educational gaps, as shown by the comparison between (a) and (c). Furthermore, the husband's earnings premiums shown in (d), which fixes both schooling and age at first marriage to 1985 averages, are generally lower than those in (c) but higher than those in (b). This result further demonstrates the overriding importance of spousal age gap relative to educational gap in the impact on status hypergamy.

2.5 Conclusions and discussion

This analysis of marital age homogamy in China from 1960 to 2005 reveals an inverted U-shaped trend, whereby age homogamy increased until the early 1990s and then began to decline. The shrinking spousal age gap trend is not surprising in the period, given reform-era social, economic, and political developments. However, the recent trend toward increasing spousal age differences is unexpected and invites explanation.

We tested the plausible "economic pressure" explanation that the post-1990s reform era environment – with its intensified labor market pressure, rising consumerism, and skyrocketing

costs of living – acted to promote marriages of older men to younger women on the basis of a need or preference for status hypergamy. Simply put, a renewed interest in status hypergamy is thought to be driven by men's increasing economic pressures to support family consumption and women's downgraded labor market prospects. In particular, given women's educational advances in reform-era China, status hypergamy is more difficult to achieve among like-aged men and women, who may have similar educational attainment and be at similar career points. Our tests of the relative impact of age and education on status hypergamy support the premise that age has begun to substitute for education as a proxy for men's higher status. In this sense, our analysis found the closing of the gender gap in educational attainment to also be a plausible causal mechanism of the reversal in age homogamy in the post-1990s reform era.

Our findings challenge the widely claimed positive relationship between economic development and age homogamy, or more generally, the link between development and family changes. This reminds us that although relationships between economic development and family changes are commonly observed, they are neither necessary nor universal. Actual social processes are much more complicated and may be unique in specific social contexts (Thornton, 2005). For example, historians Stone (1977) and Macfarlane (1979) have shown with data from Britain that individual freedom in mate selection emerged before the onset of the industrial revolution, rather than being produced by it. In this sense, the reversal of the trend in age homogamy in China's post-reform era provides another interesting, historically and context-specific case that defies a prediction based on economic development alone.

We recognize that some important pieces are still missing from this puzzle. First, as a number of researchers have argued, remarriage, cohabitation, and delays in marriage may all

have a large influence on spousal age gaps (Atkinson and Glass, 1985; Bhrolchain, 1992; Bytheway, 1981; Qian, 1998; Stier and Shavit, 1994; Todd et al., 2005; Van Poppel et al., 2001; Vera et al., 1985; Wu et al., 2000). These three phenomena may be particularly relevant in this context given their increasingly greater prevalence in reform-era China (Jiang, 2002; Jin, Li, and Feldman, 2003; Shi, 2010; Wang and Zhou, 2010; Xu, Qiang, and Wang, 2003). It is unfortunate that our dataset does not include sufficient information on any of these phenomena, but this limitation should serve as a good starting point for future research.

Second, due to the highly differential processes of social and economic development in rural versus urban China (Hauser and Xie, 2005; Xie and Hannum, 1996), our estimation of returns to education and work experience based on the CHIP urban samples is limited. Although we expect that only the levels of husbands' earnings premiums – not the trends in age or status hypergamy – will change across the rural-urban divide, separate analyses using rural and urban samples will establish more accurate conclusions.

Third, Mare and Schwartz (2006) and Torche (2010)'s works have shown fruitfulness in directly incorporating measures of husbands' earnings premiums into models of educational homogamy. Although this approach would be a more straightforward way to test our "economic pressure" explanation, the required information on spouses' educational attainment and earnings at the time of marriage is unavailable in the dataset we used.

In terms of this study's ability to project future trends in age hypergamy, we recognize that social, economic, and political events may generate new influences on marriage behaviors in post-reform era China. For example, in the face of rising social instabilities due to the skyrocketing costs of household establishments, the Chinese government may implement new

regulations to control and reduce housing prices, thereby weakening the influence of economic pressure on mate choice. It is also possible that gender inequality in the labor market may change, and/or the norm of status hypergamy may fade with time. For the near future, however, we expect the conditions driving the most recent increases in age hypergamy to continue.

Finally, the one-child policy could have an influence on spousal age gaps through its effect on the sex ratio at birth and the subsequent structure of the marriage market (Banister, 2004; Zeng et al., 1993). However, the policy's impact on the sex ratio has been mainly driven by prenatal sex detection technology, which became available in remote rural areas in the late-1980s (Chu, 2001). Thus, the imbalanced sex ratio did not affect persons covered in our analyses. For more recent cohorts it did affect, the sex ratio may benefit women by providing them with a wider range of prospective husbands. In this newer regime, men may need even more time to accumulate economic resources to become attractive to young women on the marriage market. That is, the trend in age hypergamy discovered in this paper may be further perpetuated by rising masculine sex ratios at birth since the late 1980s.

These remaining questions, the study's research limitations, and the unique context of post-reform era China all serve as stimuli for future research on marital age homogamy and on other crucial social changes taking place in contemporary China. Given our unanticipated findings, further research on age homogamy in other countries is also of great interest. Research on these topics will shed new light on the changing patterns of gender norms, gender stratification, and family behaviors across the world.

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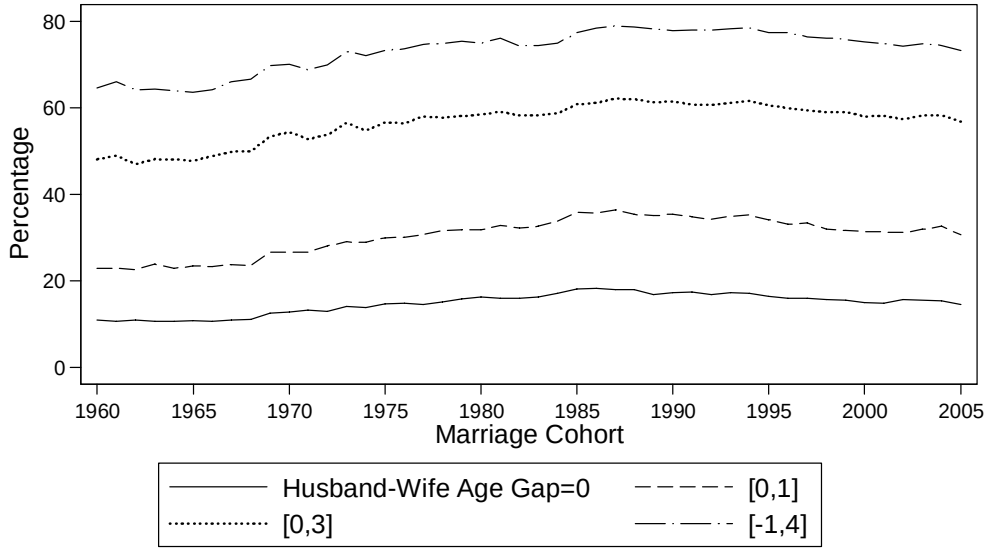
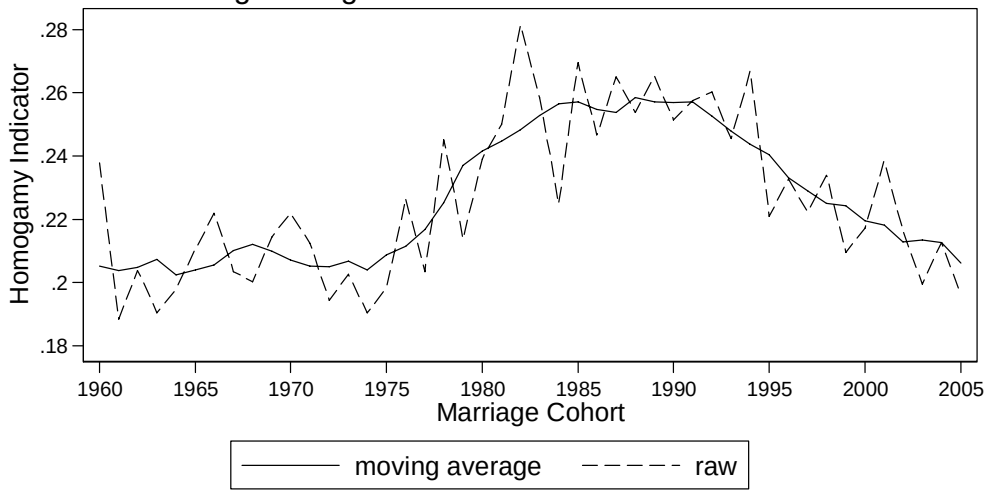
Figure 2.1. Percentage of Different Levels of Age Homogamy 1960-2005



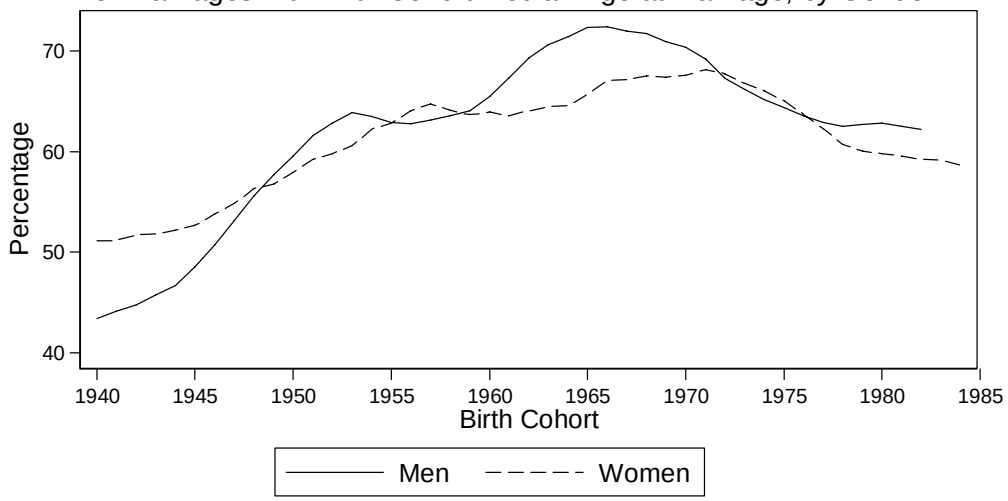
Note: Percentages are calculated by dividing number of couples with the given age gap by the total number of couples of the marriage cohort.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Figure 2.2. Levels of Age Homogamy by Force of Attraction with Moving Average 1960-2005



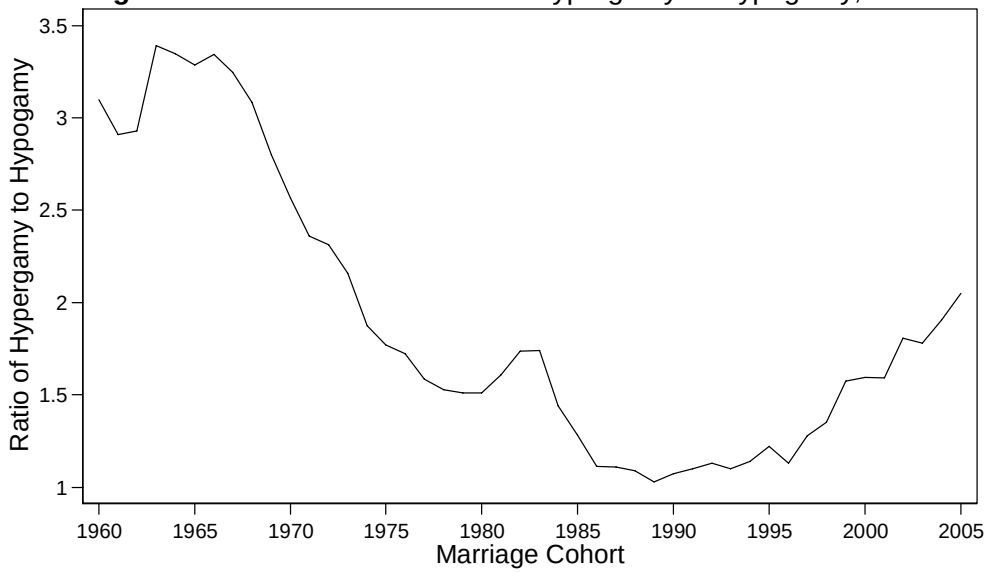
Note: Raw homogamy indicators are constructed as the ratio of sum of forces of attraction (as defined in Equation(1)) where equals, over the sum of all forces of attraction for marriage cohort 1960-2005, with age in three-year groups. Their moving averages are constructed by averaging the raw homogamy indicators for the adjacent seven marriage cohorts with equal weights. Larger indicators reflect higher levels of marital age homogamy.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Figure 2.3. Percentage of Age Homogamy with Moving Averages for Marriages with Birth Cohort Median Age at Marriage, by Gender



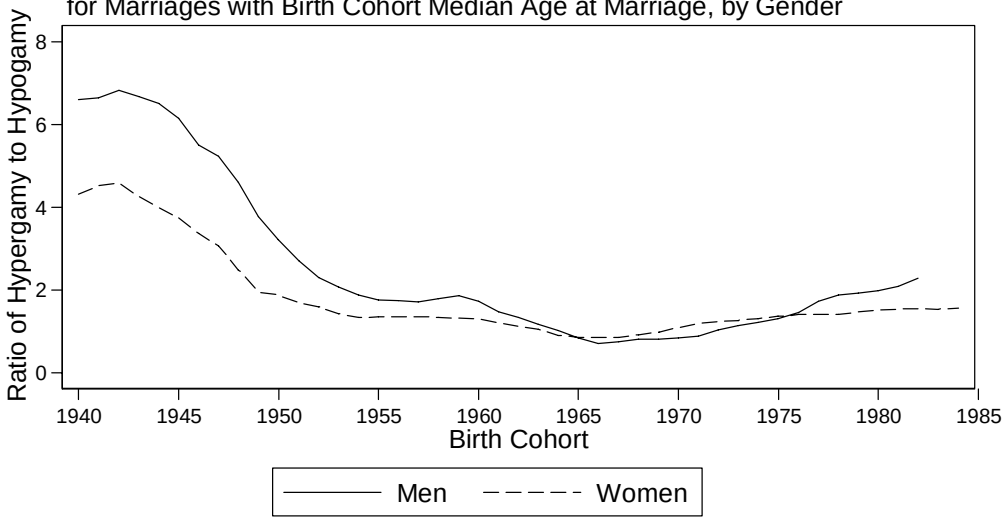
Note: Age homogamy is defined as marriages with husband-minus-wife age gaps lying between [0,3] years. For this figure, percentages of age homogamy are calculated only for those who got married at median age of first marriage within each birth cohort from 1940 to 1984, respectively for men and women. To observe the trends more clearly, we constructed moving averages for the adjacent seven birth cohorts with equal weights.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Figure 2.4. Relative Prevalence of Hypergamy to Hypogamy, 1960-2005



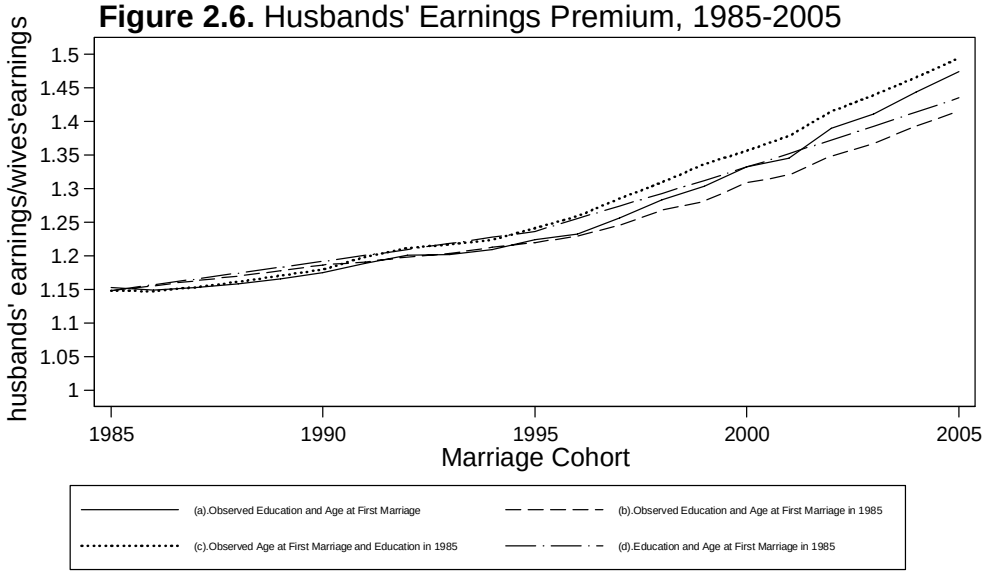
Note: As shown are ratios of age hypergamy (percent couples with husband-minus-wife age gaps larger than three years) to hypogamy (percent couples with husband-minus-wife age gaps smaller than zero) for each marraige cohort of 1960-2005.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Figure 2.5. Relative Prevalence of Hypergamy to Hypogamy with Moving Averages for Marriages with Birth Cohort Median Age at Marriage, by Gender



Note: As shown are ratios of age hypergamy (percent couples with husband-minus-wife age gaps larger than three years) to hypogamy (percent couples with husband-minus-wife age gaps smaller than zero) for those who got married at median age of first marriage within each birth cohort from 1940 to 1984, respectively for men and women. To observe the trends more clearly, we constructed moving averages for the adjacent seven birth cohorts with equal weights.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey.

Figure 2.6. Husbands' Earnings Premium, 1985-2005



Note: Husbands' earnings premiums are calculated as the ratio of husbands' to wives' earnings. Earnings are estimated by Mincer's human capital model based on years of schooling and age at first marriage of each marriage cohort.
Source: National Bureau of Statistics of China, China 2005 1% Population Inter-census Survey. Chinese Household Income Project 1988, 1995, 2002 (Urban Sample).

Appendix

Appendix Table 2.1. Homogamy Indicators Based on Forces of Attraction with Age Group of One, 1960-2005.

Marriage Cohort	Raw	Equal Weights					Varying Weights				
		Adjacent 3 cohorts	5 cohorts	7 cohorts	9 cohorts	11 cohorts	Adjacent 3 cohorts	5 cohorts	7 cohorts	9 cohorts	11 cohorts
1960	0.0959	0.0891	0.0863	0.0864	0.0881	0.0898	0.0914	0.0888	0.0879	0.0879	0.0885
1961	0.0823	0.0863	0.0864	0.0881	0.0898	0.0955	0.0853	0.0859	0.0867	0.0877	0.0898
1962	0.0806	0.0833	0.0881	0.0898	0.0955	0.0942	0.0826	0.0856	0.0873	0.0899	0.0911
1963	0.0868	0.0874	0.0885	0.0955	0.0942	0.0933	0.0872	0.0880	0.0913	0.0923	0.0925
1964	0.0947	0.0933	0.0981	0.0940	0.0933	0.0934	0.0936	0.0961	0.0952	0.0945	0.0942
1965	0.0983	0.1077	0.0990	0.0944	0.0931	0.0954	0.1053	0.1018	0.0986	0.0966	0.0962
1966	0.1300	0.1044	0.0987	0.0965	0.0968	0.0970	0.1108	0.1041	0.1008	0.0993	0.0986
1967	0.0851	0.1002	0.0988	0.1005	0.1005	0.0997	0.0965	0.0977	0.0989	0.0995	0.0996
1968	0.0856	0.0885	0.1021	0.1033	0.1032	0.1003	0.0878	0.0958	0.0991	0.1006	0.1005
1969	0.0948	0.0985	0.0990	0.1052	0.1024	0.1031	0.0976	0.0983	0.1013	0.1017	0.1021
1970	0.1150	0.1080	0.1042	0.0990	0.1046	0.1047	0.1098	0.1067	0.1033	0.1038	0.1041
1971	0.1142	0.1135	0.1045	0.1037	0.1026	0.1092	0.1137	0.1086	0.1065	0.1051	0.1063
1972	0.1113	0.1042	0.1091	0.1075	0.1096	0.1097	0.1060	0.1077	0.1076	0.1083	0.1087
1973	0.0870	0.1054	0.1086	0.1152	0.1151	0.1139	0.1008	0.1051	0.1095	0.1115	0.1122
1974	0.1179	0.1057	0.1154	0.1180	0.1191	0.1186	0.1088	0.1124	0.1148	0.1164	0.1171
1975	0.1123	0.1261	0.1200	0.1204	0.1217	0.1229	0.1227	0.1212	0.1208	0.1211	0.1217
1976	0.1483	0.1317	0.1289	0.1242	0.1247	0.1240	0.1359	0.1320	0.1286	0.1272	0.1262
1977	0.1347	0.1380	0.1329	0.1320	0.1264	0.1275	0.1372	0.1348	0.1336	0.1310	0.1299
1978	0.1312	0.1347	0.1388	0.1333	0.1337	0.1304	0.1338	0.1366	0.1351	0.1346	0.1334
1979	0.1382	0.1370	0.1345	0.1391	0.1366	0.1348	0.1373	0.1358	0.1372	0.1370	0.1363
1980	0.1416	0.1355	0.1381	0.1384	0.1392	0.1382	0.1371	0.1377	0.1380	0.1384	0.1384
1981	0.1268	0.1404	0.1407	0.1386	0.1399	0.1407	0.1370	0.1390	0.1388	0.1392	0.1397
1982	0.1528	0.1411	0.1401	0.1419	0.1405	0.1410	0.1441	0.1419	0.1419	0.1414	0.1413
1983	0.1438	0.1440	0.1427	0.1422	0.1427	0.1428	0.1440	0.1433	0.1428	0.1428	0.1428
1984	0.1355	0.1447	0.1454	0.1435	0.1446	0.1434	0.1424	0.1441	0.1438	0.1441	0.1439
1985	0.1547	0.1435	0.1450	0.1475	0.1442	0.1429	0.1463	0.1456	0.1464	0.1456	0.1448
1986	0.1403	0.1486	0.1472	0.1455	0.1448	0.1438	0.1465	0.1469	0.1463	0.1457	0.1451
1987	0.1509	0.1486	0.1478	0.1438	0.1447	0.1450	0.1492	0.1484	0.1464	0.1458	0.1455
1988	0.1546	0.1480	0.1433	0.1461	0.1443	0.1444	0.1497	0.1461	0.1461	0.1454	0.1451
1989	0.1385	0.1417	0.1455	0.1441	0.1454	0.1448	0.1409	0.1435	0.1437	0.1444	0.1445
1990	0.1320	0.1407	0.1434	0.1449	0.1447	0.1449	0.1385	0.1413	0.1428	0.1435	0.1439
1991	0.1517	0.1414	0.1417	0.1445	0.1443	0.1447	0.1439	0.1427	0.1435	0.1438	0.1441
1992	0.1404	0.1460	0.1436	0.1419	0.1445	0.1457	0.1446	0.1441	0.1431	0.1436	0.1443
1993	0.1460	0.1448	0.1445	0.1440	0.1442	0.1444	0.1451	0.1448	0.1444	0.1443	0.1444
1994	0.1481	0.1435	0.1448	0.1467	0.1439	0.1438	0.1447	0.1447	0.1456	0.1450	0.1446
1995	0.1364	0.1459	0.1470	0.1445	0.1457	0.1451	0.1435	0.1454	0.1450	0.1453	0.1452
1996	0.1533	0.1469	0.1451	0.1456	0.1459	0.1459	0.1485	0.1466	0.1462	0.1461	0.1460
1997	0.1511	0.1469	0.1450	0.1467	0.1459	0.1456	0.1480	0.1463	0.1465	0.1463	0.1461
1998	0.1365	0.1452	0.1484	0.1456	0.1461	0.1448	0.1430	0.1460	0.1458	0.1459	0.1456
1999	0.1479	0.1459	0.1459	0.1472	0.1443	0.1446	0.1464	0.1461	0.1466	0.1458	0.1454
2000	0.1533	0.1473	0.1452	0.1442	0.1451	0.1421	0.1488	0.1468	0.1457	0.1455	0.1444
2001	0.1407	0.1473	0.1443	0.1431	0.1415	0.1427	0.1456	0.1449	0.1441	0.1432	0.1430
2002	0.1477	0.1401	0.1435	0.1408	0.1403	0.1415	0.1420	0.1428	0.1420	0.1414	0.1414
2003	0.1318	0.1411	0.1369	0.1396	0.1408	0.1403	0.1388	0.1377	0.1385	0.1392	0.1395
2004	0.1438	0.1320	0.1359	0.1369	0.1396	0.1408	0.1350	0.1354	0.1360	0.1372	0.1381
2005	0.1203	0.1321	0.1320	0.1359	0.1369	0.1396	0.1282	0.1301	0.1324	0.1339	0.1355

Note: Homogamy indicators are constructed by the forces of attraction based on age groups of one year. Specifically, the groups are the single ages for those aged between 20 and 35 and we combine those under age 20 as a group 15-19 and those above age 35 as two groups 36-40 and 41-50. Moving averages are calculated to smooth the trend, and are computed respectively with equal and varying weights for the adjacent 3, 5, 7, 9 and 11 marriage cohorts. For those with three adjacent cohorts, weights applied are respectively ¼, ½ and ¼; for those with five adjacent cohorts, weights applied are respectively 1/9, 2/9, 1/3, 2/9 and 1/9; for those with seven adjacent cohorts, weights applied are respectively 1/16, 1/8, 3/16, 1/4, 3/16, 1/8 and 1/16; for those with nine adjacent cohorts, weights applied are respectively 1/25, 2/25, 3/25, 4/25, 1/5, 4/25, 3/25, 2/25 and 1/25; for those with eleven adjacent cohorts, weights applied are respectively 1/36, 1/18, 1/12, 1/9, 5/36, 1/6, 5/36, 1/9, 1/12, 1/18 and 1/36.

Source: China 2005 1% Population Inter-census Survey.

Appendix Table 2.2. Homogamy Indicators Based on Forces of Attraction with Age Group of Three, 1960-2005 (Figure 2.2).

Marriage Cohort	Raw	Equal Weights					Varying Weights				
		Adjacent 3 cohorts	5 cohorts	7 cohorts	9 cohorts	11 cohorts	Adjacent 3 cohorts	5 cohorts	7 cohorts	9 cohorts	11 cohorts
1960	0.2379	0.2131	0.2100	0.2051	0.2037	0.2048	0.2214	0.2157	0.2115	0.2089	0.2077
1961	0.1884	0.2100	0.2051	0.2037	0.2048	0.2073	0.2046	0.2049	0.2044	0.2045	0.2053
1962	0.2038	0.1942	0.2037	0.2048	0.2073	0.2068	0.1966	0.2005	0.2023	0.2038	0.2046
1963	0.1905	0.1974	0.1982	0.2073	0.2068	0.2061	0.1957	0.1971	0.2015	0.2033	0.2040
1964	0.1979	0.1996	0.2049	0.2023	0.2061	0.2069	0.1992	0.2024	0.2024	0.2037	0.2046
1965	0.2105	0.2101	0.2048	0.2040	0.2034	0.2083	0.2102	0.2072	0.2058	0.2050	0.2060
1966	0.2219	0.2119	0.2068	0.2056	0.2072	0.2059	0.2144	0.2102	0.2082	0.2078	0.2072
1967	0.2034	0.2085	0.2101	0.2100	0.2081	0.2065	0.2072	0.2088	0.2094	0.2089	0.2082
1968	0.2002	0.2060	0.2124	0.2121	0.2086	0.2064	0.2046	0.2089	0.2103	0.2097	0.2087
1969	0.2145	0.2122	0.2105	0.2098	0.2091	0.2064	0.2128	0.2115	0.2108	0.2102	0.2090
1970	0.2219	0.2163	0.2087	0.2071	0.2069	0.2064	0.2177	0.2127	0.2102	0.2090	0.2082
1971	0.2124	0.2096	0.2092	0.2052	0.2043	0.2079	0.2103	0.2096	0.2077	0.2065	0.2069
1972	0.1944	0.2031	0.2043	0.2050	0.2068	0.2062	0.2009	0.2028	0.2038	0.2049	0.2053
1973	0.2026	0.1958	0.1997	0.2067	0.2072	0.2100	0.1975	0.1987	0.2022	0.2040	0.2058
1974	0.1904	0.1972	0.2025	0.2040	0.2106	0.2112	0.1955	0.1994	0.2014	0.2047	0.2067
1975	0.1985	0.2052	0.2043	0.2087	0.2097	0.2135	0.2035	0.2039	0.2060	0.2073	0.2092
1976	0.2265	0.2095	0.2128	0.2115	0.2127	0.2160	0.2137	0.2132	0.2125	0.2125	0.2136
1977	0.2034	0.2250	0.2175	0.2167	0.2188	0.2223	0.2196	0.2184	0.2177	0.2181	0.2194
1978	0.2452	0.2208	0.2256	0.2252	0.2276	0.2281	0.2269	0.2262	0.2257	0.2264	0.2269
1979	0.2138	0.2327	0.2303	0.2371	0.2352	0.2302	0.2280	0.2293	0.2327	0.2336	0.2325
1980	0.2391	0.2343	0.2459	0.2416	0.2381	0.2374	0.2355	0.2413	0.2414	0.2402	0.2393
1981	0.2500	0.2568	0.2486	0.2447	0.2429	0.2417	0.2551	0.2515	0.2485	0.2465	0.2450
1982	0.2814	0.2633	0.2508	0.2482	0.2477	0.2452	0.2678	0.2584	0.2539	0.2517	0.2497
1983	0.2586	0.2550	0.2569	0.2529	0.2499	0.2498	0.2559	0.2564	0.2549	0.2531	0.2521
1984	0.2249	0.2510	0.2562	0.2566	0.2543	0.2516	0.2445	0.2510	0.2535	0.2538	0.2531
1985	0.2696	0.2471	0.2530	0.2571	0.2572	0.2551	0.2527	0.2528	0.2547	0.2556	0.2555
1986	0.2467	0.2604	0.2520	0.2548	0.2574	0.2568	0.2570	0.2542	0.2545	0.2555	0.2559
1987	0.2650	0.2552	0.2601	0.2538	0.2548	0.2577	0.2576	0.2590	0.2567	0.2560	0.2565
1988	0.2537	0.2614	0.2564	0.2585	0.2550	0.2544	0.2594	0.2578	0.2581	0.2570	0.2562
1989	0.2653	0.2568	0.2586	0.2572	0.2572	0.2552	0.2589	0.2588	0.2581	0.2578	0.2570
1990	0.2515	0.2581	0.2577	0.2570	0.2569	0.2548	0.2565	0.2571	0.2571	0.2570	0.2563
1991	0.2576	0.2564	0.2560	0.2572	0.2541	0.2514	0.2567	0.2563	0.2567	0.2558	0.2544
1992	0.2603	0.2544	0.2563	0.2525	0.2505	0.2492	0.2559	0.2561	0.2546	0.2531	0.2519
1993	0.2454	0.2575	0.2502	0.2479	0.2470	0.2464	0.2545	0.2521	0.2503	0.2491	0.2483
1994	0.2668	0.2444	0.2452	0.2437	0.2435	0.2424	0.2500	0.2473	0.2457	0.2449	0.2441
1995	0.2209	0.2401	0.2376	0.2403	0.2388	0.2380	0.2353	0.2366	0.2382	0.2384	0.2383
1996	0.2326	0.2253	0.2353	0.2331	0.2343	0.2368	0.2271	0.2317	0.2323	0.2330	0.2342
1997	0.2223	0.2296	0.2238	0.2290	0.2319	0.2330	0.2278	0.2256	0.2271	0.2288	0.2301
1998	0.2339	0.2219	0.2231	0.2250	0.2286	0.2275	0.2249	0.2239	0.2244	0.2259	0.2264
1999	0.2094	0.2202	0.2242	0.2243	0.2211	0.2245	0.2175	0.2212	0.2226	0.2220	0.2228
2000	0.2172	0.2217	0.2230	0.2195	0.2202	0.2181	0.2205	0.2219	0.2209	0.2206	0.2199
2001	0.2384	0.2239	0.2161	0.2181	0.2162	0.2178	0.2275	0.2212	0.2198	0.2185	0.2183
2002	0.2161	0.2180	0.2167	0.2128	0.2154	0.2162	0.2175	0.2171	0.2152	0.2153	0.2155
2003	0.1994	0.2094	0.2126	0.2133	0.2128	0.2154	0.2069	0.2100	0.2114	0.2118	0.2128
2004	0.2126	0.2028	0.2061	0.2126	0.2133	0.2128	0.2053	0.2057	0.2083	0.2099	0.2107
2005	0.1964	0.2045	0.2028	0.2061	0.2126	0.2133	0.2018	0.2023	0.2038	0.2067	0.2086

Note: Homogamy indicators are constructed by the forces of attraction based on age groups of three years. Specifically, we divide individuals into age groups 15-19, 20-22, 23-25, 26-28, 29-31, 32-35, 36-40, and 41-50. Moving averages are calculated to smooth the trend, and are computed respectively with equal and varying weights for the adjacent 3, 5, 7, 9 and 11 marriage cohorts. For those with three adjacent cohorts, weights applied are respectively ¼, ½ and ¼; for those with five adjacent cohorts, weights applied are respectively 1/9, 2/9, 1/3, 2/9 and 1/9; for those with seven adjacent cohorts, weights applied are respectively 1/16, 1/8, 3/16, 1/4, 3/16, 1/8 and 1/16; for those with nine adjacent cohorts, weights applied are respectively 1/25, 2/25, 3/25, 4/25, 1/5, 4/25, 3/25, 2/25 and 1/25; for those with eleven adjacent cohorts, weights applied are respectively 1/36, 1/18, 1/12, 1/9, 5/36, 1/6, 5/36, 1/9, 1/12, 1/18 and 1/36.

Source: China 2005 1% Population Inter-census Survey.

Appendix Table 2.3. Homogamy Indicators Based on Forces of Attraction with Age Group of Five, 1960-2005.

Marriage Cohort	Raw	Equal Weights					Varying Weights				
		Adjacent 3 cohorts	5 cohorts	7 cohorts	9 cohorts	11 cohorts	Adjacent 3 cohorts	5 cohorts	7 cohorts	9 cohorts	11 cohorts
1960	0.3727	0.3633	0.3716	0.3742	0.3758	0.3814	0.3664	0.3690	0.3711	0.3726	0.3751
1961	0.3538	0.3716	0.3742	0.3758	0.3814	0.3862	0.3671	0.3707	0.3726	0.3754	0.3783
1962	0.3882	0.3747	0.3758	0.3814	0.3862	0.3888	0.3780	0.3768	0.3786	0.3810	0.3831
1963	0.3820	0.3841	0.3831	0.3862	0.3888	0.3900	0.3836	0.3833	0.3846	0.3860	0.3871
1964	0.3822	0.3912	0.3953	0.3910	0.3900	0.3966	0.3890	0.3925	0.3919	0.3912	0.3927
1965	0.4095	0.4022	0.3991	0.3976	0.3992	0.4003	0.4040	0.4013	0.3997	0.3995	0.3998
1966	0.4148	0.4104	0.4026	0.4073	0.4086	0.4073	0.4115	0.4066	0.4069	0.4075	0.4074
1967	0.4068	0.4071	0.4174	0.4153	0.4154	0.4169	0.4070	0.4128	0.4139	0.4144	0.4152
1968	0.3997	0.4208	0.4230	0.4249	0.4239	0.4213	0.4156	0.4197	0.4220	0.4227	0.4223
1969	0.4560	0.4312	0.4301	0.4320	0.4300	0.4301	0.4374	0.4333	0.4327	0.4317	0.4312
1970	0.4379	0.4479	0.4404	0.4351	0.4377	0.4376	0.4454	0.4426	0.4393	0.4387	0.4384
1971	0.4499	0.4488	0.4478	0.4454	0.4432	0.4455	0.4491	0.4484	0.4471	0.4457	0.4456
1972	0.4587	0.4484	0.4524	0.4546	0.4533	0.4512	0.4510	0.4518	0.4530	0.4531	0.4525
1973	0.4366	0.4581	0.4577	0.4605	0.4619	0.4608	0.4527	0.4555	0.4577	0.4592	0.4597
1974	0.4788	0.4599	0.4672	0.4662	0.4682	0.4712	0.4646	0.4660	0.4661	0.4669	0.4682
1975	0.4643	0.4802	0.4709	0.4751	0.4766	0.4755	0.4762	0.4733	0.4741	0.4750	0.4751
1976	0.4973	0.4798	0.4861	0.4829	0.4826	0.4829	0.4842	0.4852	0.4842	0.4836	0.4834
1977	0.4777	0.4958	0.4930	0.4926	0.4892	0.4921	0.4912	0.4922	0.4924	0.4912	0.4915
1978	0.5123	0.5011	0.5010	0.4982	0.5019	0.4993	0.5039	0.5023	0.5005	0.5010	0.5005
1979	0.5134	0.5099	0.5052	0.5106	0.5085	0.5069	0.5108	0.5077	0.5090	0.5088	0.5082
1980	0.5040	0.5120	0.5198	0.5164	0.5148	0.5118	0.5100	0.5155	0.5159	0.5155	0.5144
1981	0.5186	0.5245	0.5250	0.5226	0.5186	0.5139	0.5230	0.5241	0.5235	0.5217	0.5193
1982	0.5509	0.5359	0.5265	0.5254	0.5197	0.5165	0.5396	0.5323	0.5293	0.5258	0.5230
1983	0.5382	0.5366	0.5321	0.5217	0.5213	0.5214	0.5370	0.5343	0.5288	0.5261	0.5246
1984	0.5207	0.5303	0.5258	0.5248	0.5233	0.5232	0.5279	0.5268	0.5259	0.5250	0.5244
1985	0.5321	0.5134	0.5209	0.5268	0.5264	0.5234	0.5180	0.5196	0.5228	0.5241	0.5239
1986	0.4873	0.5152	0.5197	0.5240	0.5261	0.5252	0.5082	0.5146	0.5187	0.5214	0.5225
1987	0.5262	0.5152	0.5219	0.5209	0.5230	0.5237	0.5180	0.5201	0.5205	0.5214	0.5221
1988	0.5322	0.5300	0.5187	0.5212	0.5191	0.5202	0.5305	0.5240	0.5228	0.5214	0.5211
1989	0.5316	0.5267	0.5258	0.5170	0.5182	0.5180	0.5279	0.5267	0.5225	0.5209	0.5200
1990	0.5162	0.5235	0.5211	0.5206	0.5162	0.5163	0.5217	0.5214	0.5210	0.5193	0.5184
1991	0.5229	0.5139	0.5172	0.5188	0.5178	0.5154	0.5162	0.5167	0.5177	0.5177	0.5170
1992	0.5028	0.5127	0.5136	0.5145	0.5173	0.5186	0.5102	0.5121	0.5132	0.5147	0.5159
1993	0.5126	0.5097	0.5108	0.5132	0.5162	0.5185	0.5104	0.5106	0.5117	0.5133	0.5149
1994	0.5137	0.5094	0.5106	0.5140	0.5155	0.5174	0.5105	0.5106	0.5121	0.5133	0.5146
1995	0.5019	0.5126	0.5145	0.5144	0.5160	0.5163	0.5099	0.5125	0.5133	0.5143	0.5149
1996	0.5222	0.5154	0.5171	0.5169	0.5156	0.5148	0.5171	0.5171	0.5170	0.5165	0.5160
1997	0.5220	0.5233	0.5183	0.5179	0.5153	0.5134	0.5230	0.5204	0.5193	0.5179	0.5165
1998	0.5255	0.5225	0.5219	0.5159	0.5147	0.5133	0.5233	0.5225	0.5196	0.5179	0.5165
1999	0.5201	0.5218	0.5174	0.5167	0.5133	0.5141	0.5214	0.5192	0.5181	0.5164	0.5157
2000	0.5199	0.5132	0.5145	0.5136	0.5155	0.5113	0.5148	0.5147	0.5142	0.5147	0.5136
2001	0.4996	0.5090	0.5096	0.5136	0.5111	0.5122	0.5067	0.5083	0.5106	0.5108	0.5112
2002	0.5076	0.5027	0.5100	0.5075	0.5097	0.5111	0.5039	0.5073	0.5074	0.5081	0.5089
2003	0.5009	0.5101	0.5025	0.5054	0.5075	0.5097	0.5078	0.5048	0.5050	0.5058	0.5069
2004	0.5219	0.5017	0.5032	0.5025	0.5054	0.5075	0.5068	0.5050	0.5040	0.5044	0.5052
2005	0.4823	0.5021	0.5017	0.5032	0.5025	0.5054	0.4955	0.4986	0.5004	0.5011	0.5023

Note: Homogamy indicators are constructed by the forces of attraction based on age groups of five years. Specifically, we divide individuals into age groups 15-19, 20-24, 25-29, 30-35, 36-40 and 41-50. Moving averages are calculated to smooth the trend, and are computed respectively with equal and varying weights for the adjacent 3, 5, 7, 9 and 11 marriage cohorts. For those with three adjacent cohorts, weights applied are respectively ¼, ½ and ¼; for those with five adjacent cohorts, weights applied are respectively 1/9, 2/9, 1/3, 2/9 and 1/9; for those with seven adjacent cohorts, weights applied are respectively 1/16, 1/8, 3/16, 1/4, 3/16, 1/8 and 1/16; for those with nine adjacent cohorts, weights applied are respectively 1/25, 2/25, 3/25, 4/25, 1/5, 4/25, 3/25, 2/25 and 1/25; for those with eleven adjacent cohorts, weights applied are respectively 1/36, 1/18, 1/12, 1/9, 5/36, 1/6, 5/36, 1/9, 1/12, 1/18 and 1/36.

Source: China 2005 1% Population Inter-census Survey.

CHAPTER 3

Context Matters: Residential Concentration and Marital Behaviors of Muslim Chinese

3.1 Introduction

Social context plays an important role in forming and framing individual's marital behaviors (Blau and Schwartz, 1997). In the sociological studies on marriage and family, the relationship between local population composition and individuals' marital choices has long been a research focus (e.g., Blau, Blum and Schwartz, 1982; Harris and Ono, 2005; Kennedy, 1943; Lewis and Oppenheimer, 2000; Lichter, Anderson and Hayward, 1995; Raley, 1996). Numerous studies have interpreted the contextual effects as structural constraints that influence one's chances to meet their potential spouses with particular traits (e.g., Blau et al., 1982; Lewis and Oppenheimer, 2000; Lichter et al., 1995; Raley, 1996). However, other studies have argued that social context may also influence individual's marital behaviors through "cultural pathways" by forming their preference for or by imposing group-level pressures against specific marital outcomes (Barber, 2004; Cheng and Xie, 2013; Jennings and Barber, 2013). Though important, it has long been argued that it is difficult, if not impossible, to separate the structural and cultural influences imposed by the social context (Cheng and Xie, 2013; Harris and Ono, 2005; Zeng and Xie, 2008).

Hui, as the only Chinese speaking Muslim group in China, are unique in their ethno-religious characteristics. Different from other Muslim Chinese ethnic groups,[12] especially those of Turkic ancestries, Hui are almost indistinguishable from the majority ethnic group Han in various characteristics including physical appearance and language, and they are well assimilated into the Han culture. Therefore, the Islamic belief is almost the only marker that keeps them a distinct ethnic group (Lipman, 2004). Hence, marrying within the Hui group, i.e., choosing ethnic endogamy,[13] has long been strictly practiced by Hui people to secure ethnic identity and to maintain religious purity (Zhou, 2001). This practice of endogamy is also enforced by the Islamic religion, which at the same time heavily values universal marriage and men's dominant positions over women (Abbasi-Shavazi and McDonald, 2008; Khairabadi, 1982; Mernissi, 1996). Therefore, Hui people's marital behaviors are constrained by both the norm of endogamy and the norm of universal marriage, and women may be under stronger normative pressures than men.

In terms of operationalization, the unique pattern of Hui's residential distribution makes the local concentration of Hui a good measure of the contextual factor that influences the individual marital behaviors. First, Hui, as the most residentially dispersed minority group in China, are most likely to be under varying contextual influences. In addition, their residential concentration shows the pattern of "national dispersion, local concentration" ("da fen san, xiao ji zhong") (Hai, 2010; Ma, 2000). In most of the cases, Hui people self-select themselves to live in places with a higher Hui concentration for more convenient living and religious activities (Hai,

[12] Muslim ethnic groups in China are divided by language. Turkic-speakers: Uygur, Qazak, Tatar, Uzbek, Salar, and Kirgiz; Mongolic-speakers: Dongxiang and Bonan; Persian-speakers: Tajiks; Chinese-speakers: Hui (Lipman 1997).

[13] Due to the marked physical distinctions between Hui and other Muslim ethnic groups, intermarriages between different Muslim groups are highly rare (China Data Center 2005). Hui Muslims mainly rely on ethnic endogamy, i.e., marriage within Hui, to maintain religious endogamy (Mackerras 1998).

2010; Ma, 2000). Therefore, in places with higher Hui concentrations, the Islamic religion has usually been practiced more thoroughly and devoutly (Mamet, Jacobson and Heaton, 2005). In this sense, the residential concentration of Hui can not only captures the level of structural constraints for Hui to meet their potential spouses inside Hui, but also captures the normative pressures against choosing exogamy or remaining single.

Accordingly, this paper addresses the following questions: how are Hui's marital behaviors framed by the two norms? When caught by the pressures from both norms, how would Hui make their marital choices? And how would Hui women's choices differ from men's? Specifically, using data from the China 2000 census and the 2005 1% inter-census survey (2005 mini-census), this paper examines how the prefecture-level Hui concentration influences Hui Muslims' choices between endogamy, exogamy and singleness, respectively for men and women. By this empirical investigation, the paper contributes to the field of marriage and family in two ways: first, it tests the contextual influence of the local ethnic marriage markets on individual marital choices on a unique Chinese Muslim group, whose residential patterns reflect both the structural constraints and cultural pressures for making marital choices. More importantly, by comparing the contextual effects across different marital outcomes and by gender, it sheds light on the relative strengths of the two cultural norms of marriage for Hui Muslims, as well as the gender difference in the strictness of those norms.

3.2 Theoretical issues and research setting

3.2.1 Marriage market conditions and marital choices

A body of literature has focused on the relationship between "field of eligibles" within the local marriage markets and the resulting marital choices (Blau et al., 1982; Blau and Schwartz, 1997; Lewis and Oppenheimer, 2000; Lichter, 1990; Lichter, LeClere and McLaughlin, 1991; Lichter et al., 1992; Lichter et al., 1995). Those studies often measure conditions of the local marriage markets either by sex ratios (Lichter et al., 1992; Lichter et al., 1995), the local concentrations of specific groups or the overall local heterogeneities in terms of age, race/ethnicity, education or economic potentials (Blau et al., 1982; Blau and Schwartz, 1997; Lewis and Oppenheimer, 2000). For interpretation, most of those studies consider conditions of the local marriage markets as structural constraints, that is, the extent to which unmarried individuals are sufficiently exposed to the opportunities to meet their potential mates (Blau et al., 1982; Blau and Schwartz, 1997).

However, aside from the structural constraints, the local marriage market can also form and frame cultural factors, such as norms and preferences (Cheng and Xie, 2013; Lichter, 1990; Zeng and Xie, 2008), which influence individuals' marital behaviors through distinctive mechanisms (Fu, 2001; Jayakody, Thornton and Axinn, 2008; Kalmijn and Van Tubergen, 2010; Thornton, 2001, 2005). Specifically, social context can operate either through local socialization or through local social pressure (Jennings and Barber, 2013). First, through close and constant interactions among individuals within the local area, the prevailing beliefs and attitudes may diffuse. This process may lead local individuals to internalize the locally dominant preference and fortify or change their own preferences to adhere to the mainstream ones (Barber, 2004; Dharmalingam, 1996; Katz, Joiner and Kwon, 2002). In addition, a local community can also exert social pressures on individuals by enforcing social norms. In order to blend in with the community, individuals may conform to the norms even when their own desires run counter to

the dominant ones (Coleman, 1990; Fishbein and Ajzen, 2010; Troyer and Younts, 1997). That is, social contexts may play a unique role in forming and changing individuals' marital behaviors, aside from the structural constraints.

For example, in places where a higher percentage of population have received post-secondary education, structurally speaking, there is a larger supply of socioeconomically attractive "candidates" for marriage and this larger supply should lead to higher rates of marriage as well as earlier ages at marriage. However, on the other hand, in those places with more highly educated individuals, people's attitudes toward marriage also tend to be more liberal and more individualistic, and they may feel less pressure to behave in alignment with others' opinions, which could result in fewer and later marriages. Hence, it is crucial to try to understand the contextual effects of the local marriage market from both the structural and cultural perspectives. In this sense, our measure of the contextual condition – local concentration of Hui – captures both the structural constraints and the cultural influences of the social context.

3.2.2 Chinese Hui Muslim

Hui Muslim is one of the ten Muslim ethnic groups and one of the fifty-five minority ethnic groups in China. While the ethnic majority Han dominate 90.95 percent of the national population, Hui only constitute 0.77 percent of the national population (China Data Center, 2005). They are highly similar to Han in physical appearance; they speak Chinese and have adopted most of the cultural practices of Han. Except for their Islamic religion, Hui are well acculturated into the majority Han (Zang, 2005, 2006, 2012). Also, as the most widely dispersed minority group, Hui are subject to varying levels of local residential concentrations and thus

experience differential tensions between the desire to retain their own ethnic identity and the necessity to assimilate into the Han culture. Since one major indicator of ethnic assimilation is the rate of intermarriage (Qian, 1997; Qian and Lichter, 2007; Schoen, Wooldredge and Thomas, 1989), Hui constitutes as an ideal group on whom we could apply the framework of the relationship between local marriage market conditions and the resulting marital choices.

It has been widely established that Islamic religion is patriarchal and endogamous in family practices (Abbasi-Shavazi and McDonald, 2008; Khairabadi, 1982; Mernissi, 1996; Morgan et al., 2002; Zang, 2005, 2006). Islam strongly emphasizes the family and takes it as the foundation of the society (Abbasi-Shavazi and McDonald, 2008). Correspondingly, as believers of Islam, Hui tend to establish their families at an early age, to value universal marriage, and to marry within the group so as to secure ethnic identity and to keep religious purity. Thus, given Hui's dual strong norms of universal marriage and endogamy, it is of interest to know, when social context imposes constraints on the realization of the two norms, how Hui persons respond? Delaying marriage, or staying single, or marrying out of the group? The answer to this question lends light to the relative strengths of the two norms. Also, according to Islam, women are considered to assume a subordinate position to men (Abbasi-Shavazi and McDonald, 2008; Khairabadi, 1982). So would women be subject to stronger religious norms in marital behaviors?

The most salient feature of the Hui's residential concentration is "national dispersion, local concentration" ("da fen san, xiao ji zhong") (Hai, 2010; Ma, 2000). Hui Muslims tend to self-select into areas with higher Hui concentration so that they could build their own living facilities, such as mosques, schools, restaurants, and perform religious practice more rigorously. That is, the residential concentration could better facilitate religious practice and secure religious

beliefs (Kalmijn, 1998). Correspondingly, in places with higher Hui concentrations, Islamic belief is usually more powerful, and Hui Muslims are often more devout and follow religious practice more strictly (Hai, 2010; Ma, 2000). Thus, in terms of its impact on marital choices, local concentration of Hui not only indicates Hui Muslims' potential opportunities to meet other eligible Hui peers as potential spouses, but also indicates the religious norms Hui Muslims are imposed or internalized for making marital choices.

To recapitulate, Hui Muslims, as believers of Islam, hold the norms of universal marriage and endogamy. Therefore, in places with higher concentration of Hui, we expect Hui to have higher marriage rate, younger age at marriage and a larger prevalence of endogamy. This could be due to both the increasing opportunities to meet other Hui as eligible marriage candidates, and the stronger norms regarding marriage, imposed or internalized. However, what would happen to Hui when they are faced with the choice between exogamy and delay of marriage or even singleness? Will they choose exogamy to fulfill the norm of universal marriage, or will they delay or even retreat from marriage to maintain the norm of endogamy? Will men and women behave differently?

More explicitly, this paper aims to answer the following three research questions:

(1) How do the marriage timing and marriage rate of Hui vary across levels of Hui concentration?

(2) How does the tendency to choose exogamy of Hui vary across levels of Hui concentration?

(3) Do Hui men and women respond to Hui concentration differently?

By answering those three questions, we apply the framework of the contextual effects on marital choices on a unique ethnic group by operationalizing both the structural and the cultural conditions of the social context. More importantly, by comparing the contextual effects on various marital choices, this study lends light to the relative strengths of the two norms regarding marriage, as well as the Islamic gender ideology for Hui people.

3.3 Data and methods

This study is mainly based on a random sample of the China 2005 1% inter-census survey (2005 mini-census). We use discrete-time hazard models and binary logit models to capture the contextual effects on marital choices. All models are estimated separately for men and women regarding their potentially differential mechanisms in marital choices (Xie et al., 2003).

3.3.1 Analytical samples

We construct two separate samples for different analyses. The first sample is a larger sample and is restricted to include those Hui Muslims aged 15-50,[14] which age range has the major risk for marriage. We use this sample to perform descriptive analyses so as to get a more general profile of the relationship between local Hui concentration and Hui's marital behaviors, considering the more limited sample availability of Hui after further data restrictions.

The second sample involves further restrictions for the statistical rigor of the main analysis.[15] First, China 2005 mini-census does not include information on place of marriage, so

[14] Descriptive statistics of this sample are in Appendix Table 2.

[15] Descriptive statistics of this sample are in Appendix Table 1.

the resulting measures of the local marriage market conditions based on their current place of residence may not reflect the contextual characteristics the individual was actually exposed to when getting married. Hence, we restrict the dataset to those who did not leave their place of residential registration and those who lived within the province of residence both one year ago (Year 2004) and five years ago (Year 2000). Second, we further restrict the sample to those who were still single in 2000 (they may remain single in 2005 or get married between 2000 and 2005) so as to include those who were under the contextual influence of 2000 in their places of residential registration as shown in the 2005 mini-census. This restriction is based on the assumption that the local concentrations of Hui are relatively stable across a five-year time span, which seems reasonable (Hai, 2010; Ma, 2000). By making this restriction, we also account for the fact that one's marital choices should be attributable to marriage market conditions before the time of marriage. Accordingly, we calculate local concentration of Hui based on the 2000 census data. Third, for individuals already married in 2005, we only include those who were in their first marriages, because the dataset only includes information on age at first marriage. These restrictions leave us with 2,804 observations for men and 2,399 observations for women. In order to capture the pool of eligible marriage candidates and to accurately estimate the likelihood of marital choices, for analysis on marital transitions from singleness, we transform the dataset into a pseudo-longitudinal format with person-years being the unit of analysis (Hannum, Wang and Adams, 2008). The total amount of exposure is 19,005 person-years for men and 13,322 person-years for women.

3.3.2 Conceptualizing the marital choices

Hui Muslims are constrained by two norms of marriage: norm of universal marriage and norm of endogamy. Practically, these norms involve the marital decisions of whether to get married and whether to marry within Hui. To examine the contextual influence on the first decision, we can simply treat endogamy and exogamy as equivalent destinations from singleness, and compute the total marriage rate based on the outcome of married versus singleness (Thornton, Axinn and Xie, 2010). However, for the second decision, we need to consider the heterogeneities among individuals, so as to gain a fuller understanding of the mechanisms of the marital choices. If we assume that the prevailing marital outcomes are an accurate reflection of one's actual marital preference, then whether to include the single persons into the analysis may influence the theoretical interpretations that follow.

Specifically, if we focus exclusively on those already married, we may conceptualize them as individuals who are fortunate enough to be able to contract the marriage with partners of their preferred type, and their existing marital choices fully reveal their marital preferences between endogamy and exogamy. By this approach, we examine the relative prevalence of exogamy over endogamy, which only measures the strength of the norm of endogamy.

However, if we introduce those who are still single into the picture, we may assume that we are including those who are still out there on the marriage market, debating between the two norms of marriage. They may be waiting for a partner who is also Hui, or they may have already foregone marriage to avoid exogamy. Based on this latter approach which includes everyone, we are conceptualizing the marital decision process as one where people treat endogamy, exogamy and singleness as independent competing options. By this approach, we can evaluate the prevalence of exogamy over singleness, which measures the relative strength of the two norms.

Practically, based on the first approach, we evaluate the contextual effects on the logged odds of exogamy over endogamy among married Hui only. Based on the second approach, we use a pair of outcomes of endogamy versus singleness, and exogamy versus singleness among all Hui (Thornton et al., 2010).

3.3.3 Measures

Dependent Variables: *Marital choices*. For the choice of getting married or not, this is a binary variable with 0=stay single and 1=married, and we use discrete-time hazard models. Conditional on getting married, for the choice between endogamy and exogamy, we use a binary variable with 0=endogamy and 1=exogamy and accordingly binary logit models. For the choice between endogamy, exogamy and singleness, we use two binary variables of endogamy or singleness with 0= stay single and 1= endogamy, and exogamy or singleness with 0=stay single and 1= exogamy, and a pair of discrete-time hazard models correspondingly.

Key Independent Variable: *Local conditions of ethnic marriage markets*. We use prefecture-level concentration of Hui to measure condition of the local ethnic marriage market. Specifically, it is calculated as the percentage of Hui population over the total population in a given prefecture. Note that we compute the percentages at the prefecture-level, an administrative unit small enough to ensure sufficient variability across units and large enough to reflect the scale of the marriage market that has actually influenced the individual marital choices. We assume relative stability in conditions of ethnic marriage markets within a time span of five years. We also assume that one's marital choice is influenced by the marriage market conditions prior to the

time of marriage, ensuring that the marriage market conditions are sufficiently exogenous to the individual marital choices. Correspondingly, we use the 2000 census data to compute the local concentration of Hui that have influenced the marital choices between 2000 and 2005. In total, we have 344 prefecture-level Hui concentrations.

Other Control Variables:

Age splines: we use spline functions for age to capture the non-linear change in the age effect. Specifically, we divide age into four groups: 15-19, 20-24, 25-29 and 30+. In order to accurately capture the age effect on marital choices at the time of marriage, we include the actual person-year-specific age for those still single in 2005. However, for those who got married between 2000 and 2005, we include their actual person-year-specific age till the year of marriage and set age fixed at age of marriage afterwards. Aside from the direct understanding of age effect, we can also take age as an indication of time to wait until marriage, that is, the "waiting time."

Education: we include it as years of schooling completed. We recode the years of schooling by: illiterate=3; primary school=6; junior high=9; senior high=12; associate degree=15; college and graduate school=17 (Xie and Hannum, 1996). This serves as an indicator of one's socioeconomic status.

Rural/urban status: we include a dummy variable with 0=urban and 1=rural to control for the salient rural-urban disparities in China (Wu and Treiman, 2004).

3.3.4 Sample issues

In order to accurately specify the population under the influence of the local marriage market conditions, we restrict the sample to a relatively immobile, young and single-person-dominant population. We do not see this as a severe challenge to the validity of the results. On one hand, China is a country with tremendous internal migration, a number of which is driven by economic incentives with high economic uncertainty (Wu and Treiman, 2004). Correspondingly, those immobile individuals who are reluctant to migrate and remain at their places of origins tend to be more conservative and consequently are more likely to conform to existing norms. Therefore, their immobility should lead to higher prevalence of universal marriage and lower likelihood of exogamy. On the other hand, young people are often more open to social changes and are also more likely to challenge existing rules and norms (McCrae et al., 1999). Thus, the disproportionately higher percentage of young adults may predict lower marriage rates and a higher incidence of exogamy. We expect the above two forces of opposing directions to counteract with each other.

In the appendix, Appendix Tables 3.1 and 3.2 show descriptive statistics, respectively based on the analytical sample (the more restricted) and the descriptive sample (the less restricted), as aforementioned. As can be seen from Appendix Table 3.1, compared to those in Appendix Table 3.2, for both genders, percentages of exogamy are consistently lower while percentages of singleness are universally higher. This is consistent with our above speculations on the sample restrictions. First, the low residential mobility in the more restricted sample may indicate a disproportionately higher percentage of Hui who are more conservative than a typical Hui Muslim. Hence, they tend to remain single so as to avoid exogamy, which leads to the high percentage of singleness and the low percentage of exogamy. To some extent, this also indicates

that for those highly conservative Hui, norm of endogamy is stronger than the norm of universal marriage. Additionally, this sample includes a disproportionately high proportion of younger people. Although they may not choose singleness eventually, they may delay marriage for a while to stay away from exogamy. Therefore, we expect an underestimation of the ratio of exogamy over singleness with lower exogamy and higher singleness.

Aside from the above differences, Appendix Tables 3.1 and 3.2 show similar patterns of variations in percentages of exogamy and singleness. Moreover, the distributions of other variables are also comparable. This indicates that except for the disproportionally higher percentage of immobile and young individuals, our more restricted analytical sample is a reasonable representation of the larger descriptive sample.

3.4 Results

3.4.1 Descriptive statistics

[TABLE 3.1 about here]

Table 3.1 presents various marital outcomes by quartiles of the corresponding population distributions for Hui, separately for men and women. Specifically, to reflect the norm of universal and early marriage, we present percent never married by age 30, percent never married by age 25 and age at first marriage among all Hui, and to echo the norm of endogamy, we compute percent exogamy among married Hui. For both genders, percent exogamy among married Hui, percent never married by age 30, percent never married by age 25, and age at first marriage are all lower in places with higher Hui concentrations. This indicates both the

increasing opportunities to meet potential spouses within Hui and the rising pressure based on Islam with higher Hui concentrations.

At all quartiles of Hui concentration, women are much less likely than men to remain single both by ages 25 and 30, and tend to marry at a younger age than men do. Note that the variations in percent never married by both ages are much smaller for women than for men, across all levels of Hui concentrations, especially so for age 30. While the percent ranges from 28.57 to 3.68 for men, the same range lies from 3.70 to 1.82 for women. This indicates that women are under a globally stronger constraint regarding the norm of universal marriage, which makes little room for the variation in Hui concentrations to take a sizable effect. Men, accordingly, are more responsive to the change in the contextual conditions. In places with lower Hui concentrations, they are so much freer to stay single than their female counterparts. Based on percent exogamy among married Hui, women are less likely to choose exogamy than men except in places with low Hui concentrations, though both the percentages and their changes with Hui concentration are highly similar across gender. In sum, the above comparisons indicate that compared to Hui men, Hui women are more severely constrained by the norm of universal and early marriage on a global basis, but may be equally restricted by the norm of endogamy.

[FIGURE 3.1 about here]

In Figure 3.1, we provide a more systematic presentation of the relationship between various marital outcomes by showing the Kaplan-Meier survival curves of Hui's marital choices across age and Hui concentration, respectively for men and women. Kaplan-Meier estimate is a nonparametric estimate of the survival function. For example, we let n_t be the number of

observations still remaining single at time t, d_t the number of observations getting married at time t. The Kaplan-Meier estimate of the survival function is:

$$S(t) = \prod_{t_i \le t} (n_i - d_i) / n_i \qquad (1)$$

And the area below the curve shows the probability of remaining single. Specifically, in Figure 3.1, the area under the lower curve shows the probability of remaining single, with d_t being the number of observations getting married at time t, and the area under the upper curve shows the probability of either remaining single or choosing exogamy, with d_t denoting the number of observations choosing endogamy at time t. Correspondingly, the gap between the two curves presents the probability of choosing exogamy. The patterns shown are consistent with the results in Table 3.1. With a higher Hui concentration, both percent married and percent endogamy are higher while percent exogamy is lower. Moreover, single Hui "drain out" much faster with shorter "waiting time" in places with higher Hui concentrations, as demonstrated by the steeper drop of the curves. Compared to men, women consistently have higher percent married, higher percent endogamy, lower percent exogamy, and shorter "waiting time."

[FIGURE 3.2 about here]

[TABLE 3.2 about here]

To gain a clearer understanding, in Figure 3.2, we present the province-level distribution of Hui concentrations, percent never married by age 30 among Hui, age at first marriage for Hui, and percent exogamy among married Hui. Consistent with the patterns shown in Table 3.1, in places with higher Hui concentrations, percent exogamy, percent never married by age 30 and age at first marriage are all lower. Table 3.2 shows the correlations between the aggregate-level Hui concentration and various marital outcomes, which, no matter at the prefecture level or at the

province level, are all negative. That is, both sets of results at the aggregate level in Figure 3.2 and Table 3.2 show similar patterns to those at the individual level, as shown in Table 3.1 and Figure 3.1. This indicates the robustness of the results.

3.4.2 Marry or not?

[TABLE 3.3 about here]

Table 3.3 shows results for the marital outcome of married or single, i.e., the total marriage rate, respectively for men and women. As can be seen from Models 1-M and 1-F, for both men and women, local concentration of Hui has positive effects on the logged odds of married over single. If we test on the gender difference, while the intercept is significantly larger for women than for men, the coefficient on the Hui concentration is significantly smaller. This echoes the patterns shown in Table 3.1. That is, women are more strictly constrained by the norm of universal marriage than men, regardless of the contextual conditions, and this leaves little room for their marriage rates to vary across Hui concentrations. However, with their larger variation in marriage rates, men's decisions on whether to marry are more responsive to the changing marriage market conditions.

Changes in the coefficients across age splines are similar for men and women. That is, before age 30, age promotes marriage with decreasing slopes; however, after age 30, Hui are less likely to get married with aging. In terms of magnitudes, the coefficients on the age splines of 15-19 and 20-24, the primary age range of mate selection, are significantly smaller for women, showing weaker promotion effects of aging for marriage. This should also be due to women's universally earlier marriage and higher marriage rates.

While years of schooling have no significant influence on the total marriage rate for men, women with higher education are less likely to get married. This may indicate a more liberal attitude toward marriage due to higher education. However, if this is the case, it is surprising why this does not show for men. Therefore, it is more possible that highly educated women face an even more restricted pool of potential marriage candidates than their lower educated women counterparts, especially considering the taboo of exogamy for Muslims. If this is the case, it implies a stronger norm of endogamy confronted by Muslim women than their male counterparts.

3.4.3 Endogamy or exogamy? Endogamy and exogamy as a choice conditional on getting married

Aside from the norm of universal marriage, another norm of marriage based on Islam is that of endogamy. As aforementioned, for the choice of exogamy, we need to consider the heterogeneities among individuals. While some of them are fortunate enough to realize their marital preferences by finding the partner of their preferred type, and will only be confronted with the choice between endogamy and exogamy conditional on getting married, some others may see endogamy and exogamy as independent alternatives to being single. Accordingly, we apply two modeling approaches to capture these two types of individuals.

For those who have succeeded in finding the spouses of their preferred type, that is, those who consider endogamy and exogamy as a choice conditional on getting married, we use the outcome variable of exogamy versus endogamy with binary logit models. Models 2-M and 2-F show results based on this approach. For both men and women, coefficients on Hui concentration are significantly negative. This indicates that for those who are able fulfill their

marital preferences, conditional on getting married, endogamy is definitely the dominant option. In addition, women's coefficient on Hui concentration, though larger, is not significantly different from that of men. This means that men and women are equally constrained by the norm of endogamy.

Moreover, while highly educated men are more likely to pursue exogamy over endogamy, the coefficient on years of schooling not only is insignificant, but is negative for women. Although the gender difference is not significant, this provides some support for the interpretation that even highly educated women find it hard to escape from the normative pressure to marry within Hui. This, again, implies a stronger norm of endogamy faced by women.

3.4.4 Endogamy or exogamy? Endogamy and exogamy as independent alternatives to being single

[TABLE 3.4 about here]

However, there are yet other people who are not as fortunate to find their preferred spouses. Due to the potential competition between the norm of universal marriage and the norm of endogamy, they may place exogamy and endogamy as parallel options to being single. How will they respond to varying contextual conditions? Table 3.4 shows results from the discrete-time hazard models with the pair of outcome variables, endogamy or singleness, and exogamy or singleness, separately for men and women. This set of models is based on the assumption that endogamy and exogamy are independent alternatives to being single. As can be seen from Models 3-M and 3-F, for both men and women, the coefficients on local concentration of Hui for the logged odds of endogamy over singleness are positive with men having larger coefficients.

However, as we move to Models 4-M and 4-F, the coefficient on Hui concentration for the logged odds of exogamy over singleness, though negative for both genders, is only significant for women. Moreover, the gender difference is not significant, which means the significant depression effect of Hui concentration on choosing exogamy for women may not be robust, especially considering its low significance level. This implies the coexistence of and the competition between the two norms. That is, in places with higher Hui concentrations, both the norm of universal marriage and the norm of endogamy get stronger. While some Hui may stay single for a possible endogamy in the future, others may sacrifice the religious purity so as to get married at all. Therefore, especially for those who place endogamy, exogamy and singleness as parallel options, at the aggregate level, the link between Hui concentration and the choice between exogamy and singleness is uncertain and indefinite.

To put things in perspective, note that in Table 3.3, the coefficients on Hui concentration in Models 2-M and 2-F not only are both significantly negative, but also are with higher significance levels than that in Model 4-F. Combined with the insignificant coefficient in Model 4-M, this comparison indicates that the choice between exogamy and delay of marriage/singleness is less evident and definitive than the choice between exogamy and endogamy. To be more concrete, for those who are fortunate enough to find the spouse of their preferred type, when the opportunities to meet their potential spouses increase and when the norm of endogamy gets stronger in places with higher Hui concentrations, he or she is definitely more likely to marry within Hui, rather than out of Hui. However, for those who are still in the process of mate selection, when caught by both norm of universal marriage and norm of endogamy, increasingly so in places with higher Hui concentrations, they may find it difficult to

choose. Should they further delay marriage or even stay single for good so as to avoid exogamy? Or should they get married anyway, disregarding the ethnicity of the spouse, so as to fulfill the norm of universal and young marriage? The competition between the two norms may lead to both positive and negative links running from Hui concentrations to the logged odds of exogamy over singleness, which result in the less significant results in Models 4-M and 4-F.

In addition, the coefficients on years of schooling show gender differences for both outcomes. As shown, for the logged odds of endogamy over singleness, the coefficients on years of schooling are both negative for men and women, though only significant for the latter. And the gender difference is significant. Similar to that for the outcome of married versus singleness, this could indicate the shrunk "pool of eligibles" for highly educated Muslim women. Nevertheless, for the logged odds of exogamy over singleness, the coefficient on years of schooling is only significant for men, though positive for both genders. Again, the gender difference is significant. This result shows that education plays a lesser role in women's tendency to choose exogamy over singleness than education for men. This implies that even for highly educated women, norm of endogamy is still a taboo that can hardly be overridden. This provides some evidence for the expectation that women are more constrained by the norm of endogamy than men. Lastly, coefficients on age show similar patterns for men and women, except for those younger age groups, which could also be due to the sample distribution characteristics.

3.5 Conclusions and discussion

This paper examines how Hui's marital choices among endogamy, exogamy and singleness vary across conditions of local ethnic marriage markets. Specifically, we explore the relative strength of the two norms regarding marriage for Hui Muslims – universal marriage, and endogamy. We also examine how the restrictiveness of the norms differs for men and women. We measure conditions of the local marriage market by prefecture-level concentrations of Hui. We investigate the influence of local Hui concentration on various marital choices using both the discrete-time event history models and the binary logit model, based on a random sample of the China 2005 mini-census data. In order to reflect the actual marriage market conditions that have influenced the marital outcomes, China census in 2000 is used to measure the local contextual conditions.

Both the descriptive and analytical results show that in places with higher Hui concentrations, Hui tend to have higher marriage rates, marry earlier and more endogamously, for both men and women. For the choice of exogamy, there are some nuances in the results. Specifically, conditional on being married, the logged odds of exogamy over endogamy is significantly lower in places with higher Hui concentrations; nevertheless, if we put exogamy as an alternative to being single, coefficient on the logged odds of exogamy over singleness is only significant for women with a low significance level. This indicates the coexistence of and the competition between the two norms.

For the comparison across gender, women have consistently higher marriage rates than men, regardless of the level of Hui concentrations. This means that women are constrained more strictly by the norm of universal marriage than men on a global basis, although men are more responsive to the change in Hui concentrations with their larger variation in marriage rates. Coefficients on both logged odds of exogamy over endogamy and exogamy over singleness

show no significant gender difference, which implies that men and women are equally restricted by the norm of endogamy. However, the coefficients on education lend some insight on the gender differences in the implementation of the norm of endogamy. While higher education can bring women some freedom to stay single, it is not associated with more exogamy for them. Men with higher education, on the other hand, are more likely to pursue exogamy. This may be due to the fact that exogamy is a more prohibitive taboo for women than for men (Khairabadi, 1982).

There are some limitations in this study. First, although we try to provide some theoretical implications for the relative strengths of the two norms of marriage, which sheds some light on a cultural perspective of the contextual effects, we still cannot directly test between the two norms, or between the structural and cultural influences. The existing research strategies can hardly work for Hui considering the limited data availability of them. Secondly, as discussed earlier, our sample is composed of disproportionately higher percentages of young, single and immobile population. Although we do not think this is a problem, it is still useful to assess our research questions based on a more representative sample. At this time, handy solutions to this issue are not available, due to the small percentage of Hui population and the active internal migration in China. Thirdly, as shown in the Appendix Table 3.2, type of exogamy, i.e., exogamy with different ethnic groups may have varying links with marriage market conditions. Again, due to the data limitations, this more nuanced analysis is not possible at the time. All the above limitations can serve as future research agenda when sufficient data become available. Last, marital choices could be affected by multiple individual characteristics (Kalmijn, 1991, 1998) and people may match on various traits with different priorities (e.g., Davis, 1941; Fishman et al., 2008; Merton, 1941; Rosenfeld, 2005, 2008; Schoen and Cheng, 2006; Schoen and Wooldredge,

1989). In the future, we can study how other domains of assortative mating (for example, marriage market, education, occupation, and language) influence the patterns of marital choices, aside from ethnicity.

This study has contributed to the literature of marriage and family, gender inequality and Chinese ethnicity. Not only has it examined the contextual influence on individuals' marital choices on a unique Chinese Muslim group, it has also facilitated a cultural perspective by evaluating the relative strength of the two norms regarding marriage, through the comparison between the relative likelihood of different marital outcomes across Hui concentration and gender. The abovementioned limitations will serve as good starting points for the future development of this study.

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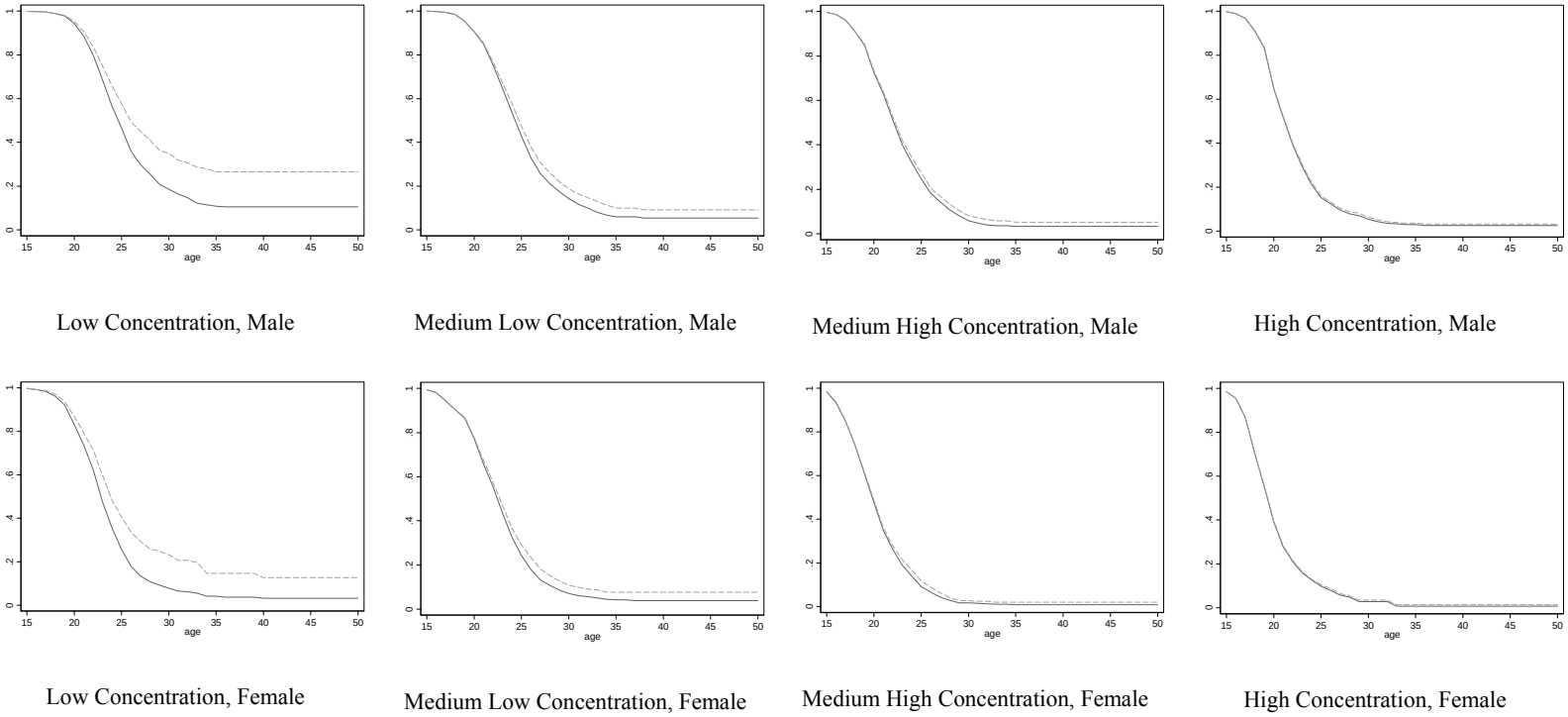

Figure 3.1. Kaplan-Meier Survival Curves of Marital Choices along Age, by Hui Concentration and Gender

Probability of Remaining Single

Probability of Remaining Single or Choosing Exogamy

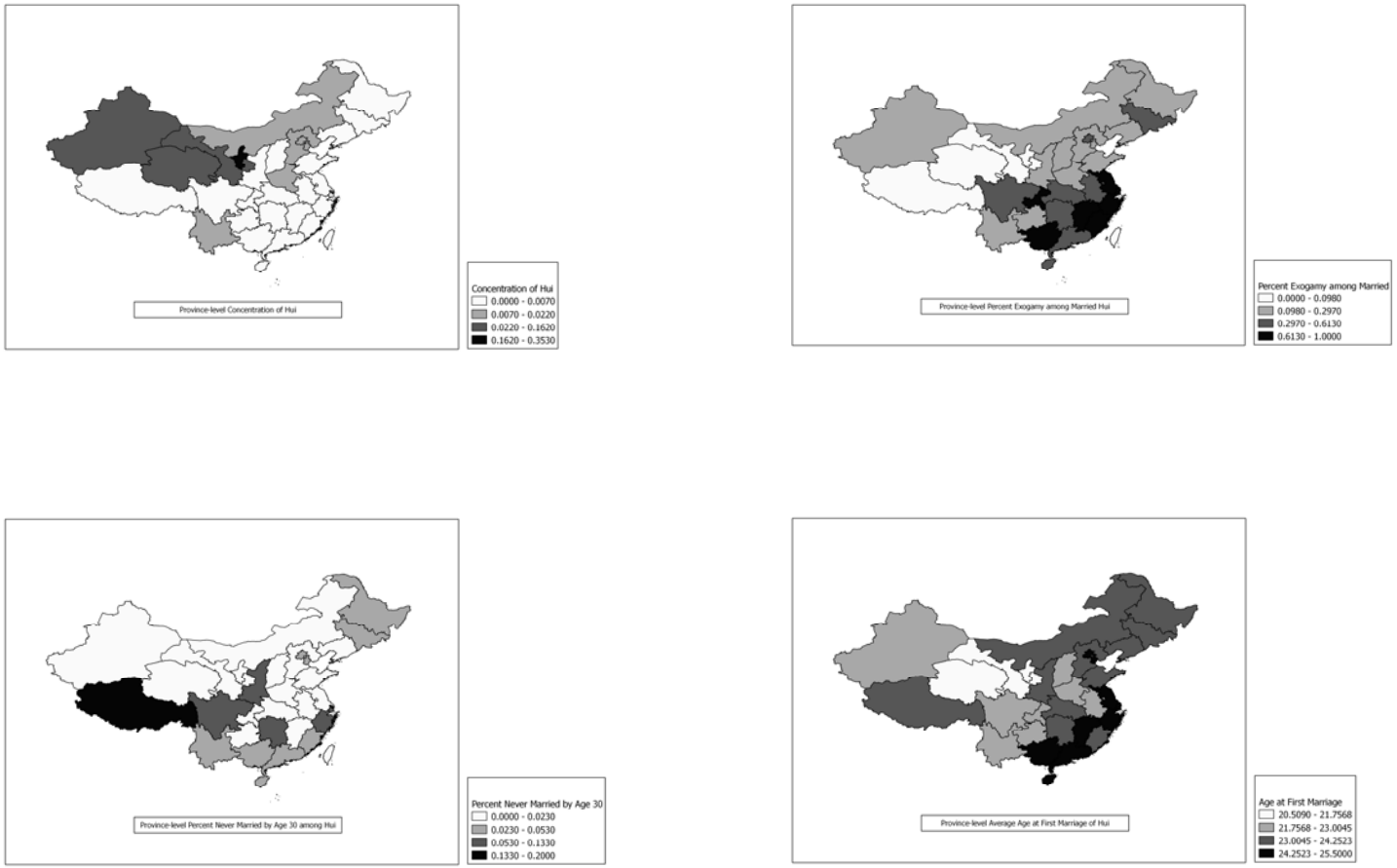

Figure 3.2. Geographical Distribution of Hui's Marital Outcomes at the Province Level

Table 3.1. Distribution of Hui's Marital Outcomes by Quartiles of Hui Concentration Level

Hui Concentration	Male (*N*=514,474)					Female (*N*=490,684)				
	%Hui among Local Population	% Never Married by Age 25	% Never Married by Age 30	Age at 1st Marriage	% Exogamy among Married	%Hui among Local Population	% Never Married by Age 25	% Never Married by Age 30	Age at 1st Marriage	% Exogamy among Married
Low-Q1	0.05	35.00	28.57	25.04	74.07	0.04	14.29	3.70	22.93	75.86
Medium Low-Q2	0.10	27.85	13.56	24.75	60.00	0.09	12.31	3.57	23.59	60.00
Medium High-Q3	0.48	16.41	9.94	24.39	32.62	0.45	7.02	1.95	22.82	31.18
High-Q4	3.88	9.07	3.68	22.73	8.32	3.98	4.33	1.82	20.78	7.84
All	1.13	10.56	4.86	22.96	12.18	1.14	4.85	1.88	21.04	11.51

Source: China 2005 1% Inter-Census Survey.

Note: All statistics are calculated based on a larger sample with restriction to population aged 15-50. N=1,005,158. % Hui among local population is calculated by dividing population of Hui by the total local population. % nerver married by age 25, % nerver married by age 30 and age at first marriage are calculated among population of Hui. % Exogamy among married is computed as percent exogamy among all married Hui.

Table 3.2. Correlations between Concentration of Hui and Hui's Marital Outcomes

		% Never Married by Age 30	Age at 1st Marriage	%Exogamy among Married
Hui Concentration	Prefecture-level	-0.0423	-0.3188	-0.1460
	Province-level	-0.2318	-0.5922	-0.3838

Source: China 2005 1% Inter-Census Survey.

Note: All statistics are calculated based on a larger sample with restriction to population aged 15-50. N=1,005,158. Concentration of Hui is calculated by dividing population of Hui by the total local population. % nerver married by age 30 and age at first marriage are calculated among population of Hui. % Exogamy among married is computed as percent exogamy among all married Hui.

Table 3.3. Local Marriage Market Conditions and Marital Choices for Hui:
Total Marriage Rate and Choice of Exogamy over Endogamy Conditional on Being Married

	Male				Female				Gender Difference (ref.=male)			
	Model 1-M		Model 2-M		Model 1-F		Model 2-F		Model 1		Model 2	
	Married /Single		Exogamy/Endogamy		Married /Single		Exogamy/Endogamy		Married /Single		Exogamy/Endogamy	
Local concentration	2.691	***	-3.816	**	1.249	**	-6.085	***	-1.442	**	-3.419	
	(0.340)		(1.430)		(0.363)		(1.706)		(0.497)		(2.794)	
Age Splines												
Age 15-19	1.837	***	12.752	***	0.973	***	1.177	**	-0.863	*	-10.956	***
	(0.355)		(0.035)		(0.099)		(0.453)		(0.369)		(0.053)	
Age 20-24	0.350	***	0.459	***	0.220	***	0.380	***	-0.129	*	0.020	
	(0.041)		(0.124)		(0.036)		(0.093)		(0.055)		(0.189)	
Age 25-29	0.070	†	0.155	†	0.052		0.012		-0.017		-0.271	
	(0.038)		(0.080)		(0.050)		(0.094)		(0.063)		(0.172)	
Age 30+	-0.187	***	-0.196	*	-0.289	***	-0.121		-0.102		1.236	
	(0.045)		(0.091)		(0.082)		(0.093)		(0.094)		(0.703)	
Years of schooling	0.014		0.071	†	-0.088	***	-0.019		-0.102	***	0.042	
	(0.016)		(0.039)		(0.017)		(0.040)		(0.023)		(0.079)	
Rural residence (reference=urban)	0.128		-0.574		-0.006		-0.533		-0.133		0.311	
	(0.133)		(0.389)		(0.144)		(0.410)		(0.196)		(0.638)	
Constant	-39.929	***	-260.162		-21.138	***	-26.471	**	18.789	***	219.103	
	(6.716)		NA		(1.840)		(8.959)		(6.963)		NA	
Observations	2,804		359		2,399		367		5,203		726	
Person-years	19,005		NA		13,322		NA		32,327		NA	
Chi-square	644.63		185.18		545.19		178.99		51.23		9.83	
DF	7								7			

Source: China 2005 1% Inter-Census Survey.

Note: The top entries are logit coefficients. Standard errors are in parentheses. Models 1-M and 1-F show results from the discrete-time hazard models; Models 2-M and 2-F show results from the binary logit models. †p<0.10; *p<.05; **p<.01; ***p<.001 (two-tailed tests).

Table 3.4. Local Marriage Market Conditions and Marital Choices for Hui: Endogamy and Exogamy as Independent Alternatives to Being Single

	Male				Female				Gender Difference (ref.=male)			
	Model 3-M		Model 4-M		Model 3-F		Model 4-F		Model 3		Model 4	
	Endogamy/Single		Exogamy/Single		Endogamy/Single		Exogamy/Single		Endogamy/Single		Exogamy/Single	
Local concentration	3.075	***	-0.873		1.500	***	-3.380	*	-1.575	**	-2.508	
	(0.363)		(1.321)		(0.386)		(1.630)		(0.530)		(2.098)	
Age Splines												
Age 15-19	1.853	***	11.146	***	0.966	***	13.178	***	-0.886	*	2.430	***
	(0.357)		(0.046)		(0.099)		(1.630)		(0.370)		(0.057)	
Age 20-24	0.323	***	0.775	***	0.180	***	0.465	***	-0.143	*	-0.310	
	(0.043)		(0.166)		(0.040)		(0.096)		(0.059)		(0.192)	
Age 25-29	0.023		0.164	*	0.030		0.059		0.007		-0.105	
	(0.045)		(0.074)		(0.063)		(0.082)		(0.077)		(0.111)	
Age 30+	-0.226	***	-0.141	*	-0.507	**	-0.166	†	-0.281		-0.025	
	(0.061)		(0.066)		(0.172)		(0.086)		(0.182)		(0.109)	
Years of schooling	-0.010		0.126	***	-0.114	***	0.010		-0.104	***	-0.116	*
	(0.018)		(0.035)		(0.019)		(0.038)		(0.026)		(0.052)	
Rural residence (reference=urban)	0.171		-0.430		-0.038		-0.199		-0.208		0.231	
	(0.145)		(0.390)		(0.156)		(0.419)		(0.213)		(0.572)	
Constant	-40.100	***	-221.036		-20.835	***	-255.916		19.265	**	-42.454	
	(6.741)		NA		(1.852)		NA		(6.990)		NA	
Observations	2,734		2,515		2,328		2,103		5,062		4,618	
Person-years	18,089		16,086		12,532		11,018		30,621		27,104	
Chi-square	538.29		212.61		462.36		192.77		48.23		14.01	
DF	7								7			

Source: China 2005 1% Inter-Census Survey.

Note: The top entries are logit coefficients. Standard errors are in parentheses. Models 3-M, 3-F, 4-M and 4-F show results from the discrete-time hazard models. †p<0.10; *p<.05; **p<.01; ***p<.001 (two-tailed tests).

Appendix

Appendix Table 3.1. Descriptive Statistics, Analytical Sample (More Restricted)

Dependent Variable:		All (*N*=5,203)	SD	Male (*N*=2,804)	SD	Female (*N*=2,399)	SD
Marital Choice							
	Single	0.860	0.347	0.872	0.334	0.847	0.360
	Endogamy	0.112	0.316	0.103	0.304	0.123	0.330
	Exogamy	0.027	0.162	0.025	0.156	0.030	0.170
Marital Choice: Detailed							
	Single	0.860	0.347	0.872	0.334	0.847	0.360
	Endogamy	0.112	0.316	0.103	0.304	0.123	0.329
	Exogamy with other 9 Muslim minority	0.001	0.028	0.001	0.038	NA	NA
	Exogamy with 45 non-Muslim minority	0.014	0.117	0.004	0.065	0.025	0.156
	Exogamy with Han	0.012	0.111	0.019	0.137	0.005	0.068
Independent Variables:							
Conditions of Local Marriage Markets							
	Local concentration of Hui	0.167	0.172	0.164	0.169	0.171	0.174
Categorical	Concentration-Q1	0.008	0.005	0.008	0.005	0.008	0.005
	Concentration-Q2	0.039	0.024	0.039	0.024	0.039	0.023
	Concentration-Q3	0.198	0.057	0.199	0.056	0.199	0.059
	Concentration-Q4	0.423	0.076	0.423	0.076	0.424	0.076
Age		20.620	5.368	21.148	5.786	20.003	4.761
Categorical	Age 15-19	0.528	0.499	0.495	0.500	0.566	0.496
	Age 20-24	0.275	0.446	0.272	0.445	0.278	0.448
	Age 25-29	0.129	0.336	0.146	0.353	0.110	0.313
	Age 30+	0.068	0.252	0.087	0.282	0.045	0.208
Control Variables:							
Years of Schooling		9.453	3.463	9.507	3.228	9.389	3.719
Categorical	Never attend school	0.070	0.255	0.047	0.213	0.096	0.294
	Primary school	0.211	0.408	0.207	0.405	0.216	0.411
	Junior high school	0.373	0.484	0.410	0.492	0.329	0.470
	Senior high school	0.224	0.417	0.229	0.420	0.220	0.414
	Associate college/above	0.122	0.327	0.107	0.309	0.140	0.347
Registration of Residence							
	Rural	0.483	0.500	0.488	0.500	0.478	0.500
	Urban	0.517	0.500	0.512	0.500	0.522	0.500

Source: China 2005 1% Inter-Census Survey.

Note: All statistics are calculated based on a smaller sample with restrictios stated in the "Data and Methods" section. N=5,203.

Appendix Table 3.2. Descriptive Statistics, Descriptive Sample (Less Restricted)							
Dependent Variable:		All (*N*=11,400)	SD	Male (*N*=5,799)	SD	Female (*N*=5,601)	SD
Marital Choice							
	Single	0.397	0.489	0.427	0.495	0.366	0.482
	Endogamy	0.532	0.499	0.503	0.500	0.561	0.496
	Exogamy	0.071	0.258	0.070	0.255	0.073	0.260
Marital Choice: Detailed							
	Single	0.397	0.489	0.427	0.495	0.366	0.482
	Endogamy	0.532	0.499	0.503	0.500	0.561	0.496
	Exogamy with other 9 Muslim minority	0.004	0.063	0.008	0.087	0.000	0.013
	Exogamy with 45 non-Muslim minority	0.036	0.187	0.013	0.115	0.060	0.238
	Exogamy with Han	0.031	0.173	0.049	0.215	0.013	0.112
Independent Variables:							
Conditions of Local Marriage Markets							
	Local concentration of Hui	0.172	0.169	0.170	0.168	0.174	0.170
Categorical	Concentration-Q1	0.009	0.005	0.008	0.005	0.009	0.005
	Concentration-Q2	0.049	0.034	0.049	0.034	0.049	0.033
	Concentration-Q3	0.213	0.053	0.213	0.053	0.212	0.053
	Concentration-Q4	0.419	0.076	0.419	0.076	0.419	0.076
Age		30.235	10.712	30.294	10.785	30.175	10.636
Categorical	Age 15-19	0.242	0.429	0.241	0.428	0.244	0.429
	Age 20-24	0.131	0.337	0.135	0.342	0.127	0.333
	Age 25-29	0.107	0.309	0.106	0.308	0.107	0.310
	Age 30+	0.520	0.500	0.518	0.500	0.522	0.500
Control Variables:							
Years of Schooling		9.453	3.463	9.507	3.228	9.389	3.719
Categorical	Never attend school	0.152	0.359	0.091	0.287	0.216	0.411
	Primary school	0.259	0.438	0.262	0.440	0.257	0.437
	Junior high school	0.324	0.468	0.374	0.484	0.272	0.445
	Senior high school	0.169	0.375	0.180	0.384	0.158	0.365
	Associate college/above	0.061	0.240	0.060	0.238	0.062	0.242
Registration of Residence							
	Rural	0.497	0.500	0.499	0.500	0.494	0.500
	Urban	0.503	0.500	0.501	0.500	0.506	0.500

Source: China 2005 1% Inter-Census Survey.

Note: All statistics are calculated based on a larger sample with restriction to Hui population aged 15-50. N=11,400.

CHAPTER 4

Motherhood Penalty and Fatherhood Premium?

Gender Disparities in Fertility Effects in China

4.1 Introduction

The relationship between fertility and employment outcomes is a crucial issue at the intersection of family and career lives (Angrist and Evans, 1998; Goldin, 1995; Gough and Noonan, 2013). The negative link between childbearing and labor force participation has been established by an array of empirical studies (e.g., Budig and England, 2001; Glauber, 2007; Goldin, 1995; Gronau, 1988; Korenman and Neumark, 1992). Some studies have further argued that due to the within-household specialization, fathers tend to devote more effort to bread-earning while mothers assume more responsibilities at home for nursing and nurturing the children (Becker, 1981, 1985; Glauber, 2007, 2008; Killewald and Gough, 2013). Therefore, as mothers are established to suffer from a "motherhood penalty" within the labor market (Angrist and Evans, 1998; Glauber, 2008; Harkness and Waldfogel, 2003; Hochschild and Machung, 1989; Joshi and Newell, 1989; Lundberg and Rose, 2000; Neumark and Korenman, 1994; Noonan, 2001; Waldfogel, 1997, 1998a, 1998b), number of children is supposed to have no or even positive impact on father's labor force participation (Killewald, 2013; Loh, 1996; Lundberg and Rose, 2000), that is, the "fatherhood premium."

However, the causal interpretation of the associations between fertility and labor force participation has been controversial considering the strong theoretical rationales that the fertility level and labor supply are jointly determined (Angrist and Evans, 1998; Goldin, 1995; Gough and Noonan, 2013; Schultz, 1981). In the first place, parents and non-parents, as well as parents with more and fewer children, can be different in observed and unobserved characteristics, such as career motivation, family values and sense of responsibility, that relate to both childbearing and labor market outcomes (Budig and England, 2001; Gough and Noonan, 2013). Moreover, not only fertility may influence the labor supply outcomes of the parents, it is also possible that individuals make decisions about childbearing based on their labor force participation performance. For example, when one is more active and successful occupationally, they are more likely to be economically prepared and thus are more ready to have more children. That is, the established fertility effects could merely be due to selection, rather than actual causality. Instrumental variables strategy (IV) is among the most powerful methods to address this issue considering the prevalence of randomness in fertility behaviors. Since an instrumental variable is supposed to be strongly correlated with the independent variable, its randomness guarantees that it only influences the dependent variable through its association with the independent variable. Thus, the potentially endogenous independent variable is purged of its non-causal correlation with the dependent variable, and the more accurate causal effects are estimated. One successful example in this line of research is Angrist and Evans's (1998) application of the IV strategy based on the sex composition of the first two births and the multiple second births in families with two or more children, using the U.S. 1980 and 1990 Census Public Use Micro Samples.

China is an ideal research setting to test the "motherhood penalty" and the "fatherhood premium," in both theoretical and methodological regards. From the theoretical perspective, China is a country with high-speed economic growth (Hauser and Xie, 2005; Xie and Hannum, 1996; Xie et al., 2013). During this process, women's social and economic status has improved tremendously. Two major demonstrations of women's upgraded social positions are the prevalence of female labor force participation and the decline in the within-household specialization (Lavely et al., 1990; Oppenheimer, 1997; Smock, Manning and Gupta, 1999; Wu and Song, 2010). Hence, in contemporary China, whether the contrast between "motherhood penalty" and "fatherhood premium" still holds is uncertain and begs empirical examinations (Bian, Shu, and Logan, 2000; Whyte and Parish, 1984; Wolf, 1984; Zuo and Bian, 2001).

From the methodological perspective, the differential implementation of the "one-child policy" in China provides a powerful instrumental variable. China's "one-child policy" was initiated around 1978 to 1980. It officially restricted the married couples to having only one child. However, the actual implementation of the policy varies with gender of the first-born child (Guo, Liu and Song, 2001). Specifically, individuals in the specified areas with their first child being a girl can exempt from the "one-child policy" and are allowed to have a second child.[16] Since gender of birth is generally considered to be randomly assigned,[17] after restricting the sample to the population who were influenced by this "exemption" policy, gender of the first child can work as a powerful instrumental variable for whether to have more than one child. By applying the IV approach, we are able to provide a causal estimate of the fertility effects.

[16] For details of the policy, please refer to Appendix Table 4.1.

[17] For discussion on the validity of this assumption, please go to the "Conclusions and discussion" section.

Moreover, among the numerous studies on "motherhood penalty" and "fatherhood premium," most of them exclusively focus on the fertility effect on employment and financial outcomes. However, family, as one of the most important terrains in individuals' lives, may impose more comprehensive and penetrating influences. Specifically, fertility behaviors may change the parents' entire life including their time use plans and subjective well-being, aside from the conventional labor market outcomes (Waite and Gallagher, 2000). If this is the case, the "motherhood penalty" and "fatherhood premium" may not necessarily hold. First of all, as a crucial fulfillment of life, having more children may compensate the parents subjectively. Secondly, if anything, mothers, often as the one interacting most with the children, may reap the most of the "subjective premium" (Waite and Gallagher, 2000). Hence, without examining the fertility effects on other outcomes, aside from the labor market outcomes, we cannot obtain a full understanding on how individuals' fertility level may change their lives.

Specifically, our research questions are:

(1) Does having more than one child influence the parents' time use, income, and subjective well-being in China?

(2) If yes, how are the effects different for fathers and mothers?

To sum up, using the nationally-representative 2010 Chinese Family Panel Studies (CFPS), this paper examines the gender-specific effects of fertility on a variety of outcomes including parents' time use, income and subjective well-being, based on the IV approach. Our main contribution is to provide an evaluation of the causal link running from fertility to both time use and subjective well-being outcomes, aside from the conventionally focused income outcomes.

4.2 Theoretical issues and research setting

4.2.1 "Motherhood penalty" and "fatherhood premium"

Under the model of within-household specialization, couples pursue a joint strategy in which they divide labor to maximize the household-level well-being (Becker, 1981, 1985). The division of labor is usually based on the comparative advantage of the spouses. Due to the gender gap in labor market outcomes and the socialized skills by gender, men are often supposed to assume the role of bread-earners, and women are accordingly, take the responsibility as home-makers (Corcoran and Courant, 1987). Thus, specialization serves as the dominant causal explanation for women's "motherhood penalty" and men's "fatherhood premium" regarding labor market outcomes (Budig and England, 2001; Glauber, 2008; Gough and Noonan, 2013; Killewald and Gough, 2013; Noonan and Corcoran, 2004; Walfogel, 1997).

However, the causality from childbearing to labor market outcomes has been controversial. Many studies argued that the established fertility effects could just be due to selection (Angrist and Evans, 1998; Budig and England, 2001; Gough and Noonan, 2013; Jacobsen, Pearce and Rosenbloom, 1999; Korenman and Neumark, 1992; Lundberg and Rose, 2000; Miller, 2011; Waldfogel, 1997). First, individuals who decide to become parents may differ from those non-parents in ways that are related to the labor market outcomes, such as career aspirations, work commitment, family values and sense of responsibility (Budig and England, 2001; Gough and Noonan, 2013). Second, individuals may make decisions on their fertility behaviors based on their labor market and financial situations (Angrist and Evans, 1998; Gough and Noonan, 2013). For example, when the employment status of a woman of childbearing age gets unsatisfactory, she may be inclined to retreat to the role of homemakers

and mothers. However, men, to the contrary, may decide to have (more) children when they are getting economically established. That is, the actual causality may run from labor market outcomes to the fertility decisions.

Studies aiming to address this selection bias have mostly done so either by directly controlling for possible differences between the parents and non-parents, or by exploiting a longitudinal structure of the dataset (Becker, 1985; Blank, 1990; Budig and England, 2001; Hill, 1979; Korenman and Neumark, 1992; Lundberg and Rose, 2000; Waldfogel, 1997). However, it is hard to sufficiently and accurately identify the relevant observed differences between the parents and non-parents, or parents with more and fewer children. It is even harder to control for the unobserved characteristics. Additionally, a longitudinal design in data is highly complicated and costly and is often of low availability. Comparatively, among various methods dealing with the selection bias, instrumental variable strategy is considered one of the most powerful (Angrist and Evans, 1998). Nevertheless, an instrumental variable that is sufficiently exogenous to the outcome variable often requires settings of natural experiments or rigorous treatment designs, thus is difficult to find. Moreover, this method is mostly applied in economic studies and has rarely been used in sociological work (e.g., Angrist and Evans, 1998; Jacobsen et al., 1999; Miller, 2011).

Furthermore, as discussed above, the fertility effects have mainly been established for employment and financial outcomes (Angrist and Evans, 1998; Budig and England, 2001; Glauber, 2007, 2008; Hill, 1979; Killewald, 2013; Killewald and Gough, 2013; Waldfogel, 1997). However, as childbearing and childrearing are such important events in one's life course, it would unavoidably influence the ways in which the individuals allocate their time, as well as the

levels of their subjective well-being (Waite and Gallagher, 2000). However, studies on the fertility effects on those outcomes have been rare (Waite and Gallagher, 2000).

4.2.2 The Chinese context

Chinese society is one that has been undergoing dramatic social changes (Xie et al., 2013). Two most salient among the variety of changes are women's upgraded social status (Hannum, 2005; Treiman, 2013; Wu and Song, 2010; Wu and Zhang, 2010; Zhang, Hannum, and Wang, 2008) and the evolution of China's one-child policy (Greenhalgh, 2008; Gu et al., 2007; Guo et al., 2001). Those two changes qualify China as an ideal research setting to examine the fertility effects, from both theoretical and methodological perspectives.

Theoretically, due to the Communist revolution and the government's enthusiastic promotion of the ideology on gender equality, women's social status has upgraded tremendously (Lavely et al., 1990). The People's Republic of China was founded in 1949 after the Communist Revolution. For the first 30 years, the Communist ideology regarding equality had been zealously promulgated, among which women's parity to men had been highlighted (Meisner, 1999; Parish, 1981; Whyte, 2010; Yu and Xie, 2013). The slogan "women hold up half the sky" ("fu nv neng ding ban bian tian") had dominated the mainstream discourse (Mauer-Fazio, Rawski, and Zhang, 1999). In the sphere of political and work life, the Chinese constitution guarantees women equal rights with men in all aspects of life and endorses the policy of "same-work, same-pay" ("tong gong tong chou") (Mauer-Fazio et al., 1999; Zuo and Bian, 2001). In the sphere of family life, in 1950, China instituted the Marriage Law, which formally legalized free-choice marriages and explicitly protected wives' rights and interests, making them equal to those

of husbands (China Administration Council, 1950: Item 5; Zuo and Bian, 2001). Throughout this process, women's social standing and economic status have both significantly improved (Hannum, 2005; Lavely et al., 1990; Song, 2009; Zhang et al., 2008). In education, women's attainment has gradually caught up with that of men (Treiman, 2013; Wu and Song, 2010: Table 2; Wu and Zhang, 2010). In employment, the gender gap in income and labor force participation has declined and the occupational distribution across gender has changed in favor of women (Meng, 1993; Parish and Busse, 1998). During the same process, gender inequality within the household had been dramatically reduced and within-household specialization had been largely eroded in contemporary China (Bian et al., 2000; Whyte and Parish, 1984; Wolf, 1984; Zuo and Bian, 2001). Correspondingly, the contrast between the "motherhood penalty" and the "fatherhood premium" may have lost its primary foundation to prevail. Thus, it is necessary to empirically examine the gender-specific fertility effects under this new circumstance of the gender power structure within the household.

Methodologically, as aforementioned, IV strategy is among the most powerful approaches to address the selection bias issue with the suitable instrumental variable in hand. The exemption policy to the one-child policy in China provides us with such a candidate. The "one-child policy" in China was initiated around 1978 and 1980 and it officially restricted married couples to having only one child (Greenhalgh, 2008; Guo et al., 2001). However, this initial version of the policy was too drastic and inflexible, and it ignored the potential heterogeneities in fertility intentions and behaviors across regions and across the urban-rural divide (Guo et al., 2001). For example, Chinese society has historically maintained a patriarchal and patrilineal family system, which values larger family size and holds a preference for male

over female offspring (Thornton and Lin, 1994; Xu, Ji and Tung, 2000; Whyte, 2003). These family values have been reserved with disproportionately higher rates in rural areas (Guo et al., 2001). Accordingly, in 1988, the one-child policy was tailored to accommodate those contextual specificities (Guo et al., 2001). Among the changes, the most salient adjustment is to implement the one child policy according to the gender of the first-born child. Specifically, individuals in the specified areas, most of which are rural, with their first child being a girl can exempt from the one-child policy and are allowed to have a second child (Gu et al., 2007; Guo et al., 2001). Therefore, parents whose first child is a girl are substantially more likely to go on to have an or more additional child(ren).[18] Since gender of birth is virtually randomly assigned, a dummy variable for whether the first-born child is a girl provides a plausible instrumental variable for further childbearing among parents with at least one child. By using the IV approach, we are able to evaluate the causal effect of fertility, which seems unlikely to obtain through regular OLS regression analysis.

4.3 Data and methods

This study utilizes the IV approach to examine the gender-specific fertility effects on the parents' time use, income and subjective well-being outcomes, based on a sample from the nationally representative 2010 Chinese Family Panel Studies (CFPS). CFPS covers a wide range of information on individuals' social and economic activities, family backgrounds and subjective outcomes. Specifically, we use the adult sample for the parents' information, and derive the

[18] This is supported by the results in Table 4.1.

children's, the spouses', and the grandparents' information by linking the adult sample to the family relationship sample.

4.3.1 Analytical Sample

Based on the adult sample and the linked information from the family relationship sample, we first restrict the dataset to those who have at least on child. Then to secure the basic validity of the analysis, we only keep those who have eligible values for all the independent variables, including the endogenous variables, the instrumental variable, and the control variables. After these restrictions, to guarantee the relevance and comparability of the outcome variables across individuals, we further restrict the sample to those aged between 20 and 50 (20 and 50 included), which age range covers the prime working ages, as well as to those who have not yet retired.

Then, regarding the childbearing behavior, since number of children will mainly influence the parents when the children are relatively young and require care, we restrict the sample to those whose first child is at or under age 18. This restriction to the parents of younger children also ensures the childbearing decisions were made under the influence of the exemption policy. Additionally, since the data do not include information on the marital parity of the respondent's spouse, to maximally ensure that the focal couples are the biological parents of the children, we further restrict the sample to those both who themselves and whose spouses are married and those who are in their first marriages at the time of the survey.

Finally, regarding the exemption policy, we make the restriction to only include those rural parents living in provinces where they can have a second child if the first child is a girl and if they are of rural residential registration status. Then we further restrict the sample to those

parents who are the ethnic majority Han, considering the fact that ethnic minorities living in rural areas are mostly allowed to have at least two children (China State Ethnic Affairs Commission, 1999). Furthermore, to maximally exploit the sample whose sample size is limited after the long list of restrictions so as to get more reliable results, we conduct single imputations for all the outcome variables with predicted values from regressions with the control variables as listed in "Section 3.3 Variables." These procedures of restrictions and imputations leave us with 1,124 fathers and 868 mothers.

As shown in Appendix Table 4.1, aside from the residential registration status, there are also other conditions under which the exemption policy based on gender of the first child can be applied. However, due to lack of the relevant information, we cannot make sample restrictions accounting for all the conditions. As a robustness check, we have experimented with different versions of sample restrictions based on the maximally retrievable information from the CFPS dataset, and the results remain highly consistent. Therefore, we do not think the sample restrictions we applied for the analytical sample will invalidate the results.

4.3.2 Instrumental Variable (IV) approach

Instrumental variable approach is among the most powerful methods to deal with the selection bias issue in establishing causality. Concretely, the instrumental variable is a variable that affects the endogenous variable, while not affecting the outcome variable other than through its effect on the endogenous variable, and the causal effect is estimated by the two-stage least squares estimator (2SLS). For example, if we name the parent's monthly income as Y, whether having

more than one child as X, and whether the first child is a girl as Z, then a reduced form model gives us the direct influence of having a girl first on the parent's monthly income:

$$Y_i = \Pi_0 + \Pi_1 Z_i + v_i \text{, where } \Pi_1 = \frac{\partial Y}{\partial Z} \quad (1)$$

However, we can notice that this reduced form model does not provide any theoretically substantive interpretations. Instead, we are more interested in a structural parameter, namely the coefficient indicating the fertility effect on the parent's monthly income. That parameter should appear in the structural equation as:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \text{, where } \beta_1 = \frac{\partial Y}{\partial X} \quad (2)$$

Based on the notations in (1) and (2), the coefficient from the reduced form model in (1) may also be written as:

$$\Pi_1 = (\frac{\partial X}{\partial Z}) * (\frac{\partial Y}{\partial X}) = (\frac{\partial X}{\partial Z}) * \beta_1 \quad (3)$$

It is most desirable if we can directly estimate the structural model in (2), given that the assignment to X is random. However, this can hardly be the case. For instance, those parents who are more family oriented tend to have more children, and they are also more likely to earn more. Thus, the causal effects estimated by the structural model in (2) may be contaminated by the selection bias and instead we should estimate the fertility effect indirectly using IV.

For a clearer illustration, in Figure 4.1, we present IV's working mechanisms. The structural model in (2) is shown as the one in the dashed box. That is, there could be some unobserved characteristics in the residual ε_i that have an impact on both X_i and Y_i. In the above example, ε_i could be one's family values. If one is more family-oriented, he or she is more likely

to have more children (X_i), and at the meantime to pursue better economic positions (Y_i) so as to provide better for the family. This results in a selection bias in the relationship between X_i and Y_i. The IV, gender of the first child (Z_i), as demonstrated by Figure 4.1, is exogenous to this endogenous relationship. Through its association with whether having more than one child and given the association between whether having more than one child and the parent's monthly income, it may also covariate with the monthly income. Given that it is well beyond human manipulation and is largely randomly assigned, it is not influenced by one's family values and thus is clear of the endogeneity "contamination." Correspondingly, if we can obtain a significant association between gender of the first child and monthly income, we are then establishing a causal relationship between whether having more than one child and monthly income.

Specifically, we can obtain the first component in (3) by estimating the model (also called the first stage model):

$$X_i = \theta_0 + \theta_1 Z_i + u_i \text{, where } \theta_1 = \frac{\partial X}{\partial Z} \qquad (4)$$

Then the IV estimate is given by the ratio of the reduced form estimate in (1) (also called the second stage model) to the coefficient from (4), the first stage model:

$$\beta_1 = \frac{\partial Y}{\partial X} = \frac{\Pi_1}{\theta_1} \qquad (5)$$

Based on this estimation procedure, assuming that gender of the first child is well randomly assigned, we can then purge X of the selection bias, and get a causal estimate of the fertility effect on the parent's monthly income.

4.3.3 Variables

Instrumental variable: *Gender of the first child*. This is a binary variable with 0=male, and 1=female. Since gender of the first-born child is relatively randomly assigned, and also because it is highly correlated with the tendency to have more children based on the exemption policy, we consider this as a good candidate for an instrumental variable.

Endogenous independent variables: *Fertility level*. In order to fully capture the fertility effects, we utilize two different measures of fertility level, one binary and the other continuous. Specifically:

Whether having more than one child: This is a binary variable with 0=only having one child and 1=having more than one child.

Number of children: This is a continuous variable indicating the number of children.

Outcome variables: We have three domains of outcome variables. Aside from the conventionally focused income and labor force participation outcome, we also include time allocated to take care of the family members, as well as the subjective well-being outcome. Specifically, we have examined the fertility effects on the following outcome variables:

Time use variables: we have used two time use variables, hours worked per month in 2009 and hours taking care of the family members last month. To make the measure of labor force participation more reliable, we generated the first variable by multiplying hours worked per day in 2009 and days worked per month in 2009. Since this variable largely varies across individuals, when conducting analysis, we use its logged form. To obtain a more general understanding on the time use allocation within the household, we add up the average daily hours

taking care of the family members both during weekdays and over the weekend, for the latest past month. To make this variable comparable in scale to the labor force participation variable, we multiply the weekly estimate by four and take its natural logarithm in the analysis.

Income variable: personal income last month. Since income has large variation across individuals in the sample, we use its logged form in the analysis.

Subjective well-being variable: this is a composite scale based on the average of six subjective ratings ranging from 1 to 5, the higher the number, the more positive the rating is. Specifically, the six ratings are: self-rated happiness, life satisfaction, self-confidence in career, self-confidence in the future, self-rated quality of social relationship and self-rated social ability.

Control variables: to control for the observed heterogeneity that may influence both the independent variables and the dependent variables, we include a rich set of control variables, which specifically are, whether working in an agricultural industry (0=no, 1=yes), whether a migrant (0=no, 1=yes), age, age at first birth, education, age gap between the oldest child and the youngest child, whether living together with the youngest child (0=no, 1=yes), whether living together with the spouse (0=no, 1=yes), whether living together with the child(ren)'s grandfather (0=no, 1=yes) and whether living together with the child(ren)'s grandmother (0=no, 1=yes).

4.4 Results

4.4.1 Validity of the instrumental variable

[Table 4.1 about here]

Table 4.1 shows differences in means by gender of the first child for both the two endogenous fertility variables and the outcome variables, separately for fathers and mothers. While the difference in means for the outcome variables is the Π_1 in Equation (5), which indicates the reduced form parameter, the difference in means for the fertility variables is the θ_1 in Equation (5), which indicates the strength of the correlation between the instrumental variable and the endogenous fertility variables. As can be seen, for both fathers and mothers, and for both endogenous fertility variables, θ_1 remains significantly positive. This indicates that gender of the first child is a highly valid and powerful instrument for both variables of whether having more than one child and of number of children. As for Π_1, for fathers, it shows that having more children may introduce a positive reduced form fertility effect on working hours, and for mothers, having more children may bring them better subjective well-being. By taking the ratio of Π_1 over θ_1, we get the Wald estimates as shown in Table 4.3, which presents the causal estimates of the fertility effects without any control variables.

[Table 4.2 about here]

Table 4.2 shows comparable results to those in Table 4.1, except that they are estimated with the control variables. Accordingly, ratios of Π_1 over θ_1 in this table are the 2SLS estimates of the fertility effects presented in Table 4.4. As can be seen, θ_1 still remains significantly positive for all the combinations, again showing the validity of the instrument. However, in this more complicated version of the models, fathers with more children do not only work more hours per month, they also spend significantly less time taking care of the family members. There is also a marginally significant bonus in subjective well-being for them. Mothers, on the

other hand, remain subjectively better off with more children, while not being influenced by fertility in both time use and income outcomes.

To maximally ensure the validity of the 2SLS IV estimates, in Appendix Table 4.2, we present a check of balance of the control variables across values of the instrumental variable. As can be seen, most differences in means by gender of the first child for the control variables are insignificant. This shows that, not only is the instrumental variable exogenous to the outcome variables, it is also highly exogenous to other independent variables included in the full model. This further demonstrates the unbiasedness of the 2SLS IV estimates.

4.4.2 Fatherhood premium?

[Table 4.3 about here]

[Table 4.4 about here]

Tables 4.3-a and 4.4-a show the fertility effects for fathers, without and with control variables. As aforementioned, they are respectively called the Wald estimates and the 2SLS estimates. As can be predicted by the results in Table 4.1-a and Table 4.2, based on both endogenous variables, with more children, fathers tend to work for more hours per month while spending fewer hours per month taking care of the family members. For number of children, fathers report marginally significant gain in subjective well-being. However, there seem to be no significant result for the logged personal income last month. Note that results in Table 4.3-a have the same directions as those in Table 4.4-a, whereas with lower significance levels. Specifically, only coefficients on the logged hours worked per month are significant in Table 4.3-a, where we do not introduce any control variables. This shows the advantage of 2SLS estimates over the Wald estimates in that

even if there is hardly any association between the instrument and the control variables, as shown by Appendix Table 4.2, controlling for those exogenous covariates can lead to more precise estimates.

Among all the significant 2SLS results in Table 4.4-a, their OLS counterparts are of the same direction, though with lower significance levels. For the logged personal income last month, though neither the OLS nor the 2SLS results are insignificant, we can notice that the 2SLS results and the OLS results are of opposite directions for both of the endogenous independent variables. All these differences indicate the necessity to apply the IV approach in estimating the fertility effects, compared to the regular OLS analysis. Also note that the only significant coefficients by the Wald estimation in Table 4.3-a have the opposite directions to those by OLS estimation. This further shows the importance of controlling for other exogenous covariates in the IV estimation.

4.4.3 Motherhood penalty?

Tables 4.3-b and 4.4-b presents the fertility effects for mothers, respectively by Wald estimates and 2SLS estimates. Consistent with the estimated Π_1 and θ_1 shown in Table 4.1-b and Table 4.2, with more children, mothers tend to fare significantly better in subjective well-being. However, there seem to be no significant fertility effects on both time use outcomes and logged personal income last month. Again, note that those causal coefficients in Table 4.3-b are of lower significance levels than those in Table 4.4-b, showing the importance of controlling for exogenous covariates for mothers.

For the significant 2SLS results on subjective well-being in Tables 4.3-b and 4.4-b, their OLS counterparts are either of the opposite directions or of the insignificant same directions. Note that for the fertility effect on the logged hours worked per month in Table 4.4-b, though both insignificant, the 2SLS results and the OLS results are of opposite directions. Comparing across gender, for this outcome, while the 2SLS results are negative for mothers, they are positive for fathers, which may indicate a remaining trace of the within-household specialization. These discrepancies between the OLS results and 2SLS results for mothers again indicate the necessity to apply the IV approach in estimating the fertility effects.

4.5 Conclusions and discussion

This paper contributes to the established field of "motherhood penalty" and "fatherhood premium" both theoretically and methodologically. From the theoretical perspective, China is a country with fast and tremendous social changes, one of which within the family sphere is the weakened norms of division of labor within the households. Hence, with the up-to-date and nationally representative dataset from 2010 CFPS, this paper demonstrates how the influence of fertility on various individual behaviors may be framed by the unique social context in contemporary China. From the methodological perspective, the differential implementations of the "one-child policy" based on gender of the first child constitute as an ideal setting to make an IV estimation of the causal effects of fertility on a variety of outcomes.

Concretely, we examine the gender-specific effects of fertility on the parents' time use, income and subjective well-being based on the IV approach, using the 2010 CFPS. While we find no effect on income, there are significant fertility effects on both time use and subjective

well-being outcomes. Specifically, with more children, fathers tend to work for more hours per month while spending less time taking care of the family members. They also report marginally significant gain in subjective well-being. For mothers, it seems having more children does not benefit them objectively in terms of both time use and income. However, based on both of the endogenous fertility variables, having more children brings mothers significantly better subjective well-being. To sum up, based on our IV estimation of the causal effects of fertility, we find premiums for both fathers and mothers and penalty for neither of them.

Yet, we are aware of the limitations of this paper and they can work as future directions of studies on the topic. First, it is possible that in those areas with a combination of various conditions of the exemption policy, the actual instrument may be more than the gender of the first child. Also, the exemption policy may not be strictly implemented in all areas. However, considering the robust predicting power of the instrumental variable shown by the results, as well as the consistent results by utilizing samples based on different restrictions, we do not see this as a severe problem. Second, although we do not think this will invalidate our study, it is still worthwhile to discuss whether gender of the first child is randomly assigned, given the increasing prevalence of the sex-selective abortions. Sex-selective abortion has mainly been enabled by the prenatal sex detection technology, which was not available in remote rural areas until the late-1980s (Chu, 2001). That is to say, the randomness of gender of the first birth may be influenced for parents covered in our analysis. However, given that the gender distribution of the first-born child in our sample is roughly even,[19] and that gender of the first birth and the

[19] In the unrestricted sample (*N*=14,166), 48.36% of the first-born children are female; in the analytical sample used in this paper (*N*=1,992), 49.65% of the first-born children are female; in the analytical sample of fathers used in this paper (*N*=1,124), 49.64% of the first-born children are female; in the analytical sample of mothers used in this paper (*N*=868), 49.65% of the first-born children are female.

tendency to have more than one child are consistently and strongly correlated, we do not think this issue will invalidate the results. Third, since the analyses are conducted on a sample with a predominant proportion of rural population, the outcome variables may not be well relevant. This might be the reason why the income variable is insignificant for both fathers and mothers. Fourth, due to the long list of restrictions, we are left with a small sample size. In the future, given more sufficient data, more reliable results should be in order. Finally, we may notice the vagueness in the implications of the time use outcomes, that is, it is controversial whether spending more time working and less time taking care of the family members should be regarded as a premium. In this paper, we make this assumption for the consistency and convenience of discussion.

This study has contributed to the literature of marriage and family, gender inequality, causal inference and contemporary Chinese studies. It has examined the fertility effects on a rich set of outcomes including time use, income, and subjective well-being in a research setting of tremendous social change in gender inequality. Not only that, it has also facilitated a causal estimation by evaluating the fertility effects through the IV approach, based on China's unique exemption policies in family planning. The abovementioned limitations will serve as good starting points for the future development of research on this topic.

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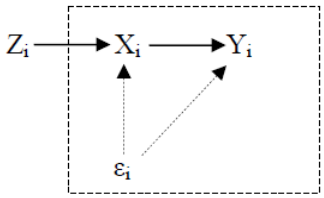

Figure 4.1. Illustration of the IV Mechanisms

Table 4.1-a. Difference in Means for Fertility and Outcome Variables, **Father Sample**

	Gender of the First Child				Difference in		
	Male (*N*=566)		Female (*N*=558)		(Female Minus Male)		
Variables	Mean	s.d.	Mean	s.d.	Mean		s.e.
Fertility Variables							
More than one child (ref.=one child)	0.49	0.50	0.70	0.46	0.21	***	0.03
Number of children	1.55	0.61	1.91	0.79	0.36	***	0.04
Outcome Variables							
Time Use Outcomes							
Logged hours worked per month in 2009	5.18	0.82	5.29	0.54	0.11	**	0.04
Logged hours taking care of family members last month	-0.21	4.01	-0.33	4.00	-0.12		0.24
Income Outcomes							
Logged personal income last month	4.09	5.43	4.44	5.22	0.35		0.32
Subjective Outcomes							
Overall subjective scale	3.79	0.66	3.83	0.66	0.05		0.04

Note: 2010 CFPS. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the varibles. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfacation, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4.1-b. Difference in Means for Outcome Variables, **Mother Sample**

	Gender of the First Child				Difference in		
	Male (*N*=437)		Female (*N*=431)		(Male Minus Female)		
Variables	Mean	s.d.	Mean	s.d.	Mean		s.e.
Fertility Variables							
More than one child (ref.=one child)	0.51	0.50	0.73	0.45	0.22	***	0.03
Number of children	1.56	0.59	1.94	0.80	0.39	***	0.05
Outcome Variables							
Time Use Outcomes							
Logged hours worked per month in 2009	5.04	0.86	5.00	0.94	-0.04		0.06
Logged hours taking care of family members last month	1.06	3.97	1.21	3.94	0.16		0.27
Income Outcomes							
Logged personal income last month	1.37	5.79	0.94	5.74	-0.43		0.39
Subjective Outcomes							
Overall subjective scale	3.77	0.62	3.86	0.65	0.09	*	0.04

Note: 2010 CFPS. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the varibles. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfacation, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4.2. OLS Estimates of Fertility (Stage 1) and Outcome (Stage 2) Equations

	Gender of the First Child (ref.=male)			
Dependent Variables	Father (*N*=1,124)		Mother (*N*=868)	
Stage 1: Fertility Variables				
More than one child (ref.=one child)	0.12	***	0.11	***
	(0.02)		(0.02)	
Number of children	0.23	***	0.24	***
	(0.03)		(0.03)	
Stage 2: Outcome Variables				
Time Use Outcomes				
Logged hours worked per month in 2009	0.11	**	-0.01	
	(0.04)		(0.06)	
Logged hours taking care of family members last month	-0.46	*	-0.38	
	(0.23)		(0.24)	
Income Outcome				
Logged personal income last month	0.37		-0.22	
	(0.28)		(0.30)	
Subjective Outcome				
Overall subjective scale	0.07	†	0.12	**
	(0.04)		(0.04)	

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the varibles. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfacation, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated with control variables described in Appendix Table 4.2. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4.3-a. OLS and Wald Estimates of Outcome Models, **Father Sample**

Dependent variables	Father (*N*=1,124)			
	Time Use Outcomes		**Income Outcome**	**Subjective Outcome**
	Logged hours worked per month in 2009	Logged hours taking care of family members last month	Logged personal income last month	Overall subjective scale
Estimation methods				
More than one child				
OLS	-0.07	-0.09	-1.26 ***	-0.08 *
	(0.04)	(0.24)	(0.32)	(0.04)
Wald	0.53 *	-0.55	1.63	0.22
	(0.21)	(1.11)	(1.52)	(0.19)
Number of children				
OLS	-0.04	0.01	-0.75 **	-0.05 †
	(0.03)	(0.16)	(0.22)	(0.03)
Wald	0.31 *	-0.33	0.97	0.13
	(0.12)	(0.66)	(0.90)	(0.11)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the varibles. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfacation, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated without any control variables. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4.3-b. OLS and Wald Estimates of Outcome Models, **Mother Sample**

Dependent variables	Mother (*N*=868)			
	Time Use Outcomes		**Income Outcome**	**Subjective Outcome**
	Logged hours worked per month in 2009	Logged hours taking care of family members last month	Logged personal income last month	Overall subjective scale
Estimation methods				
More than one child				
OLS	-0.07	0.70 *	-2.39 ***	-0.18 ***
	(0.06)	(0.27)	(0.39)	(0.04)
Wald	-0.18	0.71	-1.97	0.40 †
	(0.28)	(1.23)	(1.76)	(0.21)
Number of children				
OLS	-0.04	0.47 *	-1.34 ***	-0.11 ***
	(0.04)	(0.18)	(0.27)	(0.03)
Wald	-0.10	0.40	-1.10	0.22 †
	(0.16)	(0.69)	(0.99)	(0.12)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the varibles. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfacation, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated without any control variables. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4.4-a. OLS and 2SLS Estimates of Outcome Models, **Father Sample**

Dependent variables	Father (*N*=1,124)			
	Time Use Outcomes		**Income Outcome**	**Subjective Outcome**
	Logged hours worked per month in 2009	Logged hours taking care of family members last month	Logged personal income last month	Overall subjective scale
Estimation methods				
More than one child				
OLS	0.002	-0.16	-0.37	-0.01
	(0.06)	(0.36)	(0.44)	(0.06)
2SLS	0.94 *	-3.87 †	3.09	0.57
	(0.38)	(2.03)	(2.46)	(0.34)
Number of children				
OLS	0.02	0.05	-0.19	0.03
	(0.04)	(0.23)	(0.28)	(0.04)
2SLS	0.48 *	-1.97 †	1.57	0.29 †
	(0.19)	(1.02)	(1.24)	(0.17)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the varibles. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfacation, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated with control variables described in Appendix Table 4.2. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4.4-b. OLS and 2SLS Estimates of Outcome Models, **Mother Sample**

Dependent variables	Mother (*N*=868)			
	Time Use Outcomes		**Income Outcome**	**Subjective Outcome**
	Logged hours worked per month in 2009	Logged hours taking care of family members last month	Logged personal income last month	Overall subjective scale
Estimation methods				
More than one child				
OLS	0.09	0.16	-0.41	-0.03
	(0.09)	(0.39)	(0.48)	(0.07)
2SLS	-0.11	-3.37	-1.96	1.02 *
	(0.50)	(2.17)	(2.71)	(0.42)
Number of children				
OLS	0.06	0.03	0.05	0.02
	(0.06)	(0.24)	(0.30)	(0.04)
2SLS	-0.05	-1.58	-0.92	0.48 *
	(0.23)	(0.99)	(1.27)	(0.18)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the varibles. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfacation, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated with control variables described in Appendix Table 4.2. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Appendix

Appendix Table 4.1. Exemptions Policy to Have a Second Child with One Girl

Condition	Province
The parents live in mountain area, rural residents, one girl only	Beijing; Tianjin; Shanxi; Inner Mongol; Jilin; Heilongjiang; Zhejiang; Anhui; Fujian; Jiangxi; Henan; Hubei; Hunan; Guangdong; Chongqing; Guizhou; Shannxi; Gansu.
The parents work in mining industry and directly work in mines, one girl only	Hebei; Jiangsu; Zhengjiang; Anhui; Shandong; Henan.
Mother rural, one girl only	Guangxi.
Mother rural, one girl only and with rural registration	Liaoning; Shandong.
Mother rural, one girl only, father living with his parents-in-law, mother without brothers	Jiangsu.
Mother rural, one girl only, father without brothers and with only one sister	Jiangsu.
Mother rural, one girl only, spouse living in coastal farming areas	Jiangsu.
Mother rural, one girl only, one of the spouse in marine fishing	Jiangsu.
Both parents rural, one of the spouse having non-heritable physical disability, one girl only	Jiangsu.
One of the parents works as contract worker in farming industry, one girl only	Jilin.
One of the parents works in marine fishing industry, one girl only	Shandong.
One of the parents has non-heritable physical disability, one girl only	Shandong.

Source: Population and Family Planning Commission of Shanxi website. http://www.sxrk.gov.cn/Article.jsp?ArticleID=4623

Appendix Table 4.2. Differences in Means for Control Variables

Variables	Difference in means by gender of the first child (ref.=male)			
	Father (*N*=1,124)		Mother (*N*=868)	
Agriculture	-0.015		0.020	
	(0.029)		(0.033)	
Migrant	0.017		0.001	
	(0.018)		(0.021)	
Age	0.438		-0.225	
	(0.353)		(0.385)	
Age at first birth	0.508	**	0.043	
	(0.195)		(0.205)	
Illiterate or semi illiterate	0.041	*	0.029	
	(0.020)		(0.030)	
Primary	-0.058	*	-0.002	
	(0.027)		(0.032)	
Junior middle	0.023		-0.028	
	(0.030)		(0.031)	
Senior middle	-0.007		0.003	
	(0.018)		(0.017)	
Associate college or above	0.002		-0.002	
	(0.010)		(0.011)	
Age gap between the oldest child and the youngest child	1.250	***	1.390	***
	(0.209)		(0.240)	
Youngest child coresidence	0.007		0.002	
	(0.008)		(0.011)	
Spouse coresidence	0.004		0.002	
	(0.004)		(0.009)	
Grandfather coresidence	-0.024		-0.020	
	(0.028)		(0.013)	
Grandmother coresidence	-0.001		-0.013	
	(0.029)		(0.014)	

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the varibles. Province of the respondent's residential registration is also controlled for as a set of dummy variables to single out the regional fixed effect. P-value of Pearson's Chi-square test for association between gender of the first child and province of residential registration is 0.513 for fathers, and 0.764 for mothers. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

CHAPTER 5

Conclusion

Contemporary China has experienced dramatic economic, social and demographic changes, especially after the start of its economic reforms in the late 1970s (Xie and Hannum, 1996; Xie et al., 2013). Among the changes, the increasing prevalence of gender equality had been one of the most salient (Hannum, 2005; Meisner, 1999; Parish, 1981; Whyte, 2010), and women's status both within and outside the household had been improved tremendously (Mauer-Fazio et al., 1999; Treiman, 2013; Wu and Song, 2010; Zuo and Bian, 2001). Specifically, women's educational level started to catch up with that of men (Treiman, 2013; Wu and Zhang, 2010), women have been actively participated in labor force (Wu and Song, 2010; Lavely et al., 1990), and the within-household specialization had been greatly weakened (Bian et al., 2000; Whyte and Parish, 1984; Wolf, 1984; Zuo and Bian, 2001).

However, note that China has long been a patriarchal and patrilineal society (Thornton and Lin, 1994; Whyte, 2003). Therefore, when the economic reform had been implemented more deeply and more thoroughly, an increasing focus on short-term efficiency had disproportionately disadvantaged the labor market conditions for women (Lavely et al., 1990). Moreover, considering China' gigantic population and its relatively limited resources per capita, economic reform has brought about fierce market competition and unparalleled economic pressures for both men and women. Accompanying the rising consumerism and the skyrocketing costs of

household establishments, some married women may begin to go back to their roles of homemakers and some single women may aim for stronger economic potentials in men during the process of mate selection (Yu and Xie, 2013). That is, China's unique social dynamics may have made the same process of economic reform produce different, or even opposite social forces.

This resumed "patriarchy" is reflected in the results from both Chapters 2 and 4. Specifically, in Chapter 2, the results imply that women have resumed their predominant enthusiasm to marry men who are more economically established and thus usually older, which leads to a reversal of the increasing trend in age homogamy during the post-1990 reform era. In Chapter 4, we find that only fathers are working for more hours and spending less time taking care of family members when having more children, which may constitute as evidence for the remaining or resumed within-household specialization.

In addition to those consequences due to the temporal changes in contemporary China, its regional heterogeneities have also uniquely shaped individuals' marriage and family behaviors. Chapter 3 provides us with such a case. Specifically, this chapter examines how marital behaviors of Hui Muslims respond to varying conditions of local ethnic marriage markets. Results show that in places with higher Hui concentrations, Hui tend to have higher marriage rates, marry earlier and marry more endogamously. Conditional on being married, the logged odds of exogamy over endogamy is significantly lower in places with higher Hui concentrations; nevertheless, if we put exogamy as an alternative to being single, coefficient on the logged odds of exogamy over singleness is only significantly negative for women. This indicates the competition between the norm of universal marriage and the norm of endogamy. Moreover,

while men are more responsive to the change in Hui concentrations, women are constrained more strictly by the norm of universal marriage than men on a global basis. Men and women are equally restricted by the norm of endogamy.

This dissertation contributes toward understanding of the contextual influences, temporal or regional, on individuals' marriage and family behaviors, under a dynamic research setting. Future directions for this line of research point toward the incorporation of theories which account for the setting-specific mechanisms regarding gender, marriage and family.

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